SCIENTIFIC AMERICAN

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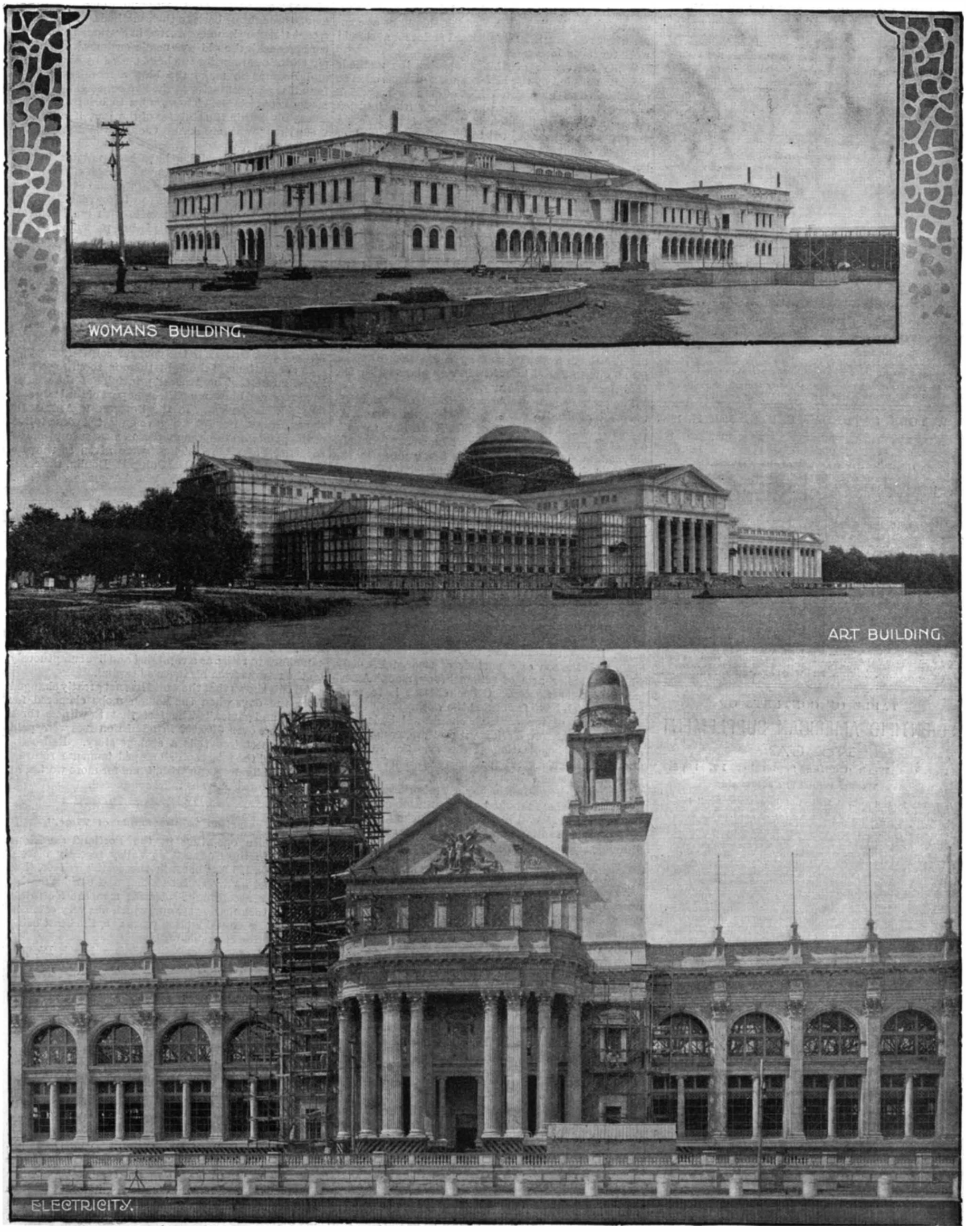

WORLD'S COLUMBIAN EXPOSITION—PRESENT APPEARANCE OF BUILDINGS.—[See page 180.]

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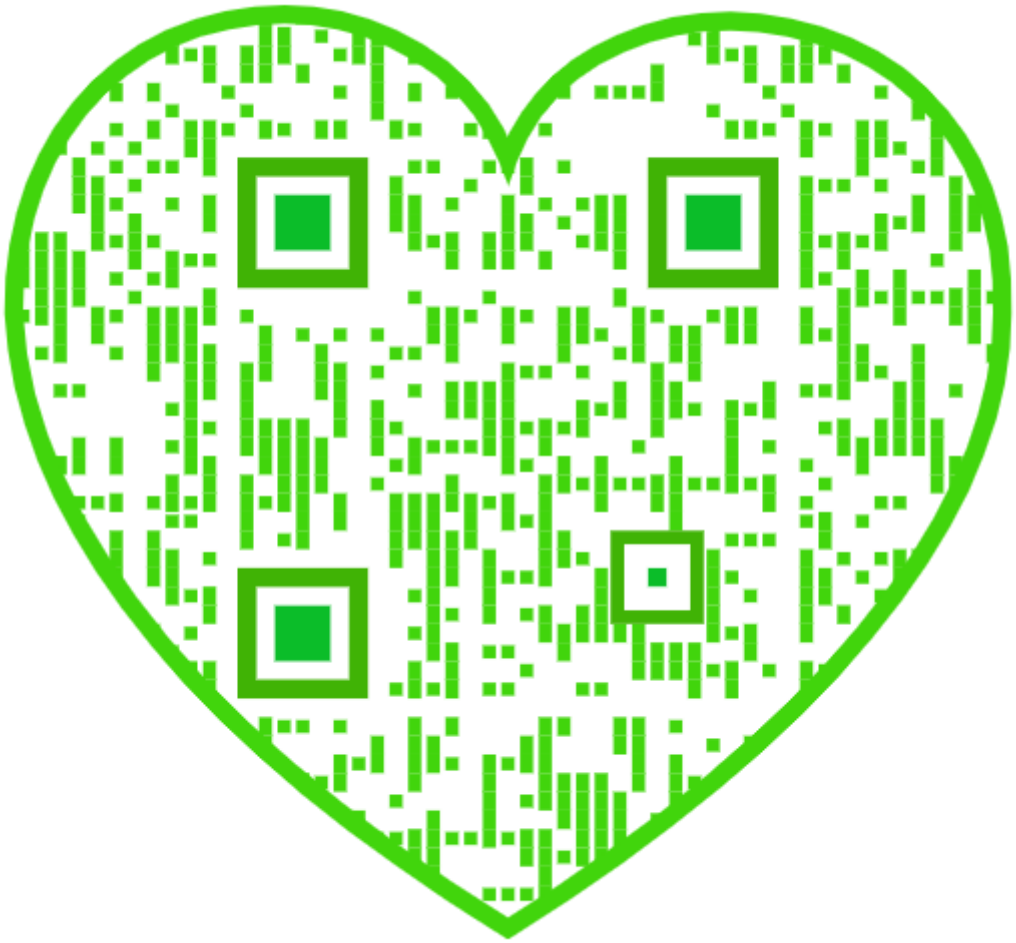

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THE NEED OF IMPROVED QUARANTINE STATIONS.

The threatened invasion of our seaports by cholera has rapidly grown into prominence as day after day new ships from the infected ports of Europe have anchored in the mouth of the harbor of New York, which may be said to be the principal gateway of the continent.

The federal government has, by its declaration of quarantine, re-enforced the local authorities. Under the circumstances, the absolute exclusion of cholera should be an easy task. The situation of New York, the great tracts of uninhabited territory near it, the small width of water to be patroled, are factors that facilitate the health officers' work. The pecuniary interests involved in the exclusion of cholera, and the resources of the United States which should be at command for resisting it, are additional factors that should work for its exclusion.

While this state of things obtains, the methods hitherto adopted by the health authorities are open to criticism. The antiquated idea of quarantine, which is the detention of all persons arriving from infected ports, and their confinement on board of the infected vessels, has been carried out to the letter. Instead of promptly removing the passengers to salubrious places and fighting the disease with nature's weapons—fresh air, good food, and pure water—the least possible thought seems to have been given to these great weapons of the sanitarian. Ships from the infected ports are detained. Crowded as they are at this season, they are left at anchor, with all their passengers and crew on board, fit places for the germs to incubate in. If disease breaks out upon them, the sick may sooner or later be removed. Adequate disinfection is impossible under such circumstances, but the best that could be done is not accomplished. The additional incentive to the plague of anxiety of mind is superadded to the other conditions—conditions of man's own creation. Communication with the ships is virtually cut off, and the unfortunate passengers are thrown at once into a quarantine of isolation, in accordance with the traditions of the last century.

The proper course would seem to be the establishment of rational quarantine stations on shore. At Sandy Hook, at the mouth of New York Bay, there is a tract of government property which would be admirably adapted for the purpose. Some miles to the eastward on the sandy shores of Long Island there are isolated beaches which are ideal places for the purpose. Fire Island is a beach or sand spit, separated by a large bay from Long Island proper, and facing on the ocean. Here there is a large hotel which might be appropriated for the well, while special stations could be established for those seriously sick and for the convalescent. Other places equally well adapted for such uses could be named.

At last a better outlook seems at hand. Mr. J. Pierpont Morgan, of this city, has privately chartered the large and commodious steamboat Stonington, and to her the cabin passengers from one of the detained ships, the Normannia, are to be transferred. Very aptly he is the son of a partner of George Peabody, who by similar acts of philanthropy made American generosity famous. Other citizens have made tenders which have facilitated the work.

The lesson of the occasion should not be lost. It has shown that New York is without proper means for resisting the importation of disease. For this port, above all others, a great quarantine station should be permanently established. Instead of two little islands built up on shoals in the bay, Swinburne and Hoffman Islands, there should be a quarantine and detention ground of several hundred acres extent, with the best possible sanitary appliances, water supply and drainage arrangements.

THE SECOND BATTLE OF NEW ORLEANS.

Nearly eighty years have passed since General Andrew Jackson won his fame in the defense of New Orleans against the British army, concentrated on its capture. His defense of the position and the strategy he displayed in it were, to a certain extent, an important step toward the presidential chair which he subsequently occupied. We can well conceive the interest felt all over the United States when the news of the victory was received by the slow processes of mail coach and mounted mail carrier. In many places the news of the battle and of its result must have been simultaneously received. There were then no preliminary details, sent by telegraph all over a continent, no hourly display on bulletin boards of the record of American or English success in the different phases of the battle.

Eighty years later all is changed. Again a battle is fought in New Orleans. It is not a battle of armies, but of two individuals. The railroads have furnished palatial trains to carry the participants to the spot. The telegraph transmits preliminary bulletins as to the exact physical condition of the competitors. When the contest begins, every feature in it is telegraphed far and wide, so that three thousand miles away the results are almost as quickly known as at the ring side. The crowded streets of distant cities, filled with people waiting for bulletins up to midnight of the eventful day, the daily press moralizing over the brutality of the thing in one column and devoting five times the space in other columns to describing it, preach a curious sermon. It is questionable if any event for years past has excited the same widespread interest as the prize fight in New Orleans. The people showed that the old love for a physical contest was alive. The supposed advance in civilization has not cured their love for it—it has only made them a little ashamed of it. The coming presidential contest will hardly prove more exciting than the story of the downfall of the world's pugilistic champion.

The development of personal contests since the days of the classic athletes of Greece and Rome has to an extent brought us back to their methods. No fight of recent time has been conducted in costume more in accordance with the old gymnastic customs. Even the old cestus or armor for the hands, used by the Greeks and Romans to make the blow a more severe one, found its representative in the five ounce gloves of the modern contestants. These, worn to bring the affair ostensibly within the statutes of the law, if anything made the blows more severe than if the bare hands had been used.

The methods of training have been notable in the tendency to light gymnastics. The great effort to attain quickness of action seems in the case of the victor to have been so successful as to win for him the fight. The skipping rope was a favorite with both contestants in their training. The picture presented to the mind's eye of a modern Hercules skipping the rope like a school girl is, to say the least, a curious one.

The contest of Dares and Entellus, described in the Æneid by Virgil, and parodied by Thomas Moore in his matchless verse, has been cited as analogous. In both cases there was a difference in age, but where Virgil gave the victory to the older man, better training, better ability, or some factor or factors, gave the prize in New Orleans to the younger contestant.

In the methods of the fight there is room for a feeling of interest. The general principles of the winner were repeated blows upon the same part of the body and face of his opponent. In the SCIENTIFIC AMERICAN SUPPLEMENT, No. 776, we gave an article descriptive of the points on the human person most susceptible to the effects of a blow. These were given as the gist of the explanations by Dr. Philip E. Donlin, the coroner's physician of this city, who has made coma and shock a special study. In the recent contest, one of these blows were nearly given, which, it is stated, would have ended the contest much earlier, had it been received.

The ethics of the affair take another aspect. By making himself champion of the world the victor has opened for himself a business career which otherwise, even under the auspices of his former millionaire employer, he would never have had. He at once acquires a small fortune in the stakes at issue, He will next travel through the country and exhibit himself, and at the end of a year, with proper management, he can afford to retire as a capitalist and live sumptuously on the returns from his invested capital.

All this shows that the world has not greatly changed from the days when the Roman mobs clamored for "bread and games." The fact that to witness three prize fights over $100,000 in admission fees were paid by the spectators tells a strange story. Railroads, hotels, and the telegraph all reaped immense returns, and the daily press can wish, if not for more worlds, at least for more Sullivans to be conquered.

"Footprints in the Sands of Time."

Quarrymen operating in the Portland sandstone quarries in the Connecticut Valley recently blasted out a block, 130 feet beneath the earth's surface, that was spotted with very interesting and curious marks. The marks, according to scientific men, are footprints of the Anisichnus deweyanus, which was very common in the valley several million years ago, the beast being a combination crocodile-bird.

It is the opinion of Prof. William North Rice, of Wesleyan University, to whom the fossil slab was sold for one hundred dollars, that at the time the deweyanus flourished there was no Connecticut River, but in place of it a bay that was fifteen miles wide, extending from the sound to the border of Massachusetts. In that epoch, a good many million years since, this crocodile-bird used to bathe in the bay, then come out of it, shake himself, and gambol awhile on the plastic micaceous sand, then on top of the earth; and so he left his mark on it. In time the sand became gelid, the world grew over it, and now workmen toiling in the bowels of the earth, 130 feet below its surface, come on the playground of the Anisichnus deweyanus; and a professor studying the tracks imprinted in the sandstone is able to tell just what sort of a creature strode about in the Connecticut Valley when Time was a babe. Wonderful, indeed, is the eye of Science, even when it wears spectacles and follows the humdrum vocation of teaching the modern dude. —*Stone.*

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Personal Recollections of Eminent Men.

BY DR. P. H. VANDER WEYDE.

Prof. Kaiser, astronomer, of the University of Leyden, Holland.

Prof. Olmsted, physicist, of Yale College, New Haven.

On my fifteenth birthday my father said: "I unpacked that box in the attic, about which you asked what there was in it. You can now see." I rushed up stairs and found a middle-sized Gregorian telescope set up before the window, and pointed to the south. I rushed down again to thank him, and he said he wanted that I should begin with seeing for myself, what he had only read in the books, that the sun turns around its axis really in 28 days; and had wondered what this period had to do with the revolution of the moon around the earth, which also takes 28 days, while the distance of the moon from the earth is very nearly the same as the distance of the surface of the sun from its center. This is one of the puzzles which his thoughtful mind occasionally brought forward, and which I never could solve. He told me, further, that this telescope had been offered to him for sale, that he had requested General Krayenhoff to inspect it, that the general pronounced it very old fashioned but good at that, very serviceable for a student in astronomy, and worth far more than the price asked. It was provided with dark glass eye pieces, so as to adapt it for observations of the sun spots. I have for a long time preserved the drawings made from day to day of the continual change of position of the sun spots in the summer of that same year, 1828.

No wonder that I soon became very desirous for the acquaintance of astronomers, among whom in later years Prof. Kaiser, of the Leyden University, was the most eminent. He was one of the pioneers in the enormous improvements made during the succeeding twenty years in the method of mounting telescopes.

Our principal conversation at the last meeting in March, 1849, was about Maedler's new book on astronomy, which I had bought in Germany, where it had just been published, and in which I found for the first time the theory brought forward that the sun's enormous high temperature was simply the result of the mutual gravitation of one million earths united. This suited me, as I never had been able to believe in Herschel's hypothesis that the sun was a dark body surrounded with a luminous atmosphere. I held that Herschel was deluded to follow the then prevailing fashion to make all heavenly bodies inhabitable, not even excluding the sun and moon; and, therefore, he held that the sun was a dark, comfortably cool body, on the surface of which human beings or perhaps angels lived, in a perpetual day, produced by a stratum of luminous clouds in the upper regions of their atmosphere. The novelty of this idea made it popular, especially in France, where Fontenelle published a book entitled "*Sur la Pluralité des Mondes*," which, being written in the most elegant language, was soon in the hands of almost every French scholar, and was then as much talked about as is now the case with Tyndall's book, "Heat as a Mode of Motion."

Maedler's book interested Prof. Kaiser so much that I left it with him, as I had read it all, and I rejoiced that my belief, which was originally that of Newton, was akin to that of Prof. Kaiser, one of the most eminent astronomers of the time.

Prof. Kaiser soon after published a book on astronomy, similar to that which was published on the sun by Father A. Secchi, of Rome, in 1870, and recently by Prof. Langley, of Washington, each of them fully up to the standard of knowledge at the time of their publication.

After arriving in New York in May, 1869, I saw to my joy the announcement that Prof. Olmsted, of Yale College, New Haven, would give in the Tabernacle (at that time in Broadway, near Reade Street) a lecture on the nature of the sun. This being exactly the subject which I had been so earnestly discussing before leaving Europe, I was very anxious to hear the opinion of an American savant on it.

I must confess that I was somewhat surprised to find that Prof. Olmsted only explained the idea of Herschel, and went into details about the cool surface with a perpetual day, and that the luminous rays reaching us from the sun carried no heat with them, but that this heat was only developed in our earth when the rays reached its surface, and that the sun spots proved this theory, as they were nothing but holes in the luminous envelope, through which holes we saw the dark, solid and cool body of the solar globe itself.

After the lecture I could not help asking for conversation with the professor, and I brought forward the argument of Maedler, about gravitation as a cause of heat, that a million earths piled together as one mass must necessarily become heated by immense pressure, which the interior parts had to endure by the weight of the superincumbent masses, not to speak of the heat developed at the moment of their collision when uniting. Prof. Olmsted, however, denied that gravitation had anything to do with their holding together, that they might hold together by simple cohesion, "the same *as is the case with a lump of sugar*." These were his own words.

I could scarcely believe my own ears, when I heard this out of the mouth of a college professor, and would surely have disbelieved that he made such a statement if it had been told me by somebody else. But when I saw that he ignored gravitation in such a case, and asserted that a mass like the sun was held together by cohesion alone, it was overwhelming for me, and I concluded that further talk would have to be postponed to a more suitable time and place.

Nancy Hanks' Record Beaten by a Bicycle.

It is but a few days ago that all previous records of fast trotting for the distance of one mile, on a circular track, were beaten by the performance of Nancy Hanks, who trotted a mile in 2 minutes 7 seconds. The trotting of a mile in such quick time, and the fast time which has also been made in other recent records, is now conceded to have been largely aided by the employment of a pneumatic tire upon the wheels of the sulkies, an improvement first introduced in connection with the safety bicycle. But even the wonderful record of Nancy Hanks has now been beaten by a rider upon a safety bicycle. This was achieved by Arthur A. Zimmerman, of the New York Athletic Club, at Hampden Park, Springfield, Sept. 9, the rider covering the distance of a mile in 2 minutes 6⅘ seconds, and thus beating the record established by Nancy Hanks by one-fifth of a second. It is to be noted, however, that Nancy Hanks has a record of trotting a mile on the kite-shaped track in the time of 2 minutes 5¼ seconds. The advantages offered by such a track over the half mile circular track at Springfield are supposed to fully equal the difference made in the time of the trotting record, and the trial of the wheel against the horse upon a kite-shaped track will now be looked for with the greatest interest, as, under equal conditions, the bicycle rider has already beaten the fastest horse trotting record.

There is no telling where future contests will end, either with horses or men. Since July 20, this year, when the first pneumatic sulky was used in a race, there has simply been a revolution in trotting records. One strange thing about the new wheels with these ball bearings is that the horses are not tired a bit after a fast heat, and can repeat again and again. They seem to push the horse along, there is no vibration, and they are from three to five seconds faster at least than the old wheel.

The Rubber Hat Bag Industry.

BY I. A. SHERMAN.

The manufacturers of straw and other hats have adopted for a long time the use of the rubber hat bag in forming the shape of this piece of head covering. In speaking of other hats than straw its use is not so extensive, being limited to a few qualities of felt, but in the straw braid it now is fairly indispensable. It does not altogether fill the bill, however, and its points of unreliability will be noted.

The rubber hat bag is shaped very much like a hat, the crown being more conical and the rim as broad as the Mexican sombrero. The schedule of measurements given by one manufacturer will allow an idea to be formed of their dimensions. In his particular bags the diameter of the crown at the base on the outside is 6¾ inches and at the top 4 to 4¾ inches, with a height of 4, 5, or 6 inches. The rim is from 20½ to 26 inches wide and $\frac{7}{32}$ or ¼ inch thick. The crowns are sometimes made oblong, and again nearly square. It has a peculiar look, but, closely examined, it is a triumph of workmanship. Made of the purest and finest Para, it is very flexible and yielding notwithstanding its thickness, three times that of some mats, or equal to a four-ply packing. It has a very smooth finish, and it brings $2.25 per pound, and when it is considered that these articles range from 3½ to $5\frac{1}{16}$ pounds in weight each, an idea can be formed of the expense of keeping a factory supplied with them.

The mode of their use varies. Each factory has its manner of using them, and as a rule it is a secret of the workshop. Broadly speaking, the wooden hat block rests in a strong frame, the straw is riveted to the rubber bag at the edge of the rim, and then a hydraulic press comes down on to the inverted hat bag, which is filled with water, with a force of nine hundred pounds. The water evenly fills out the rubber hat bag and its shape is communicated to the straw braid, one hat after another passing through this process as rapidly as they can be fastened and pressed.

Straw men, however, vary largely in some steps in the method. Some use hot steam, others cold water, and others heat the press. Some place a piece of sole leather between the bag and the straw, the idea being that the gum is too yielding and allows the straw to bury itself in the rubber. This is a logical conclusion, an illustration of it being found in the billiard cushion, which must have a wire or some rigid surface at point of contact to prevent the elasticity of the gum doing the opposite of what was intended. Another class of manufacturers use unvulcanized bags, on the theory that the heat of the steam will perform the work of vulcanization. One method is good for a certain class of work, and a second for a different, and so the theories of the different manufacturers cannot be safely criticised.

Some braids are finer than others and the finish must be nicely done, and in that case greater care and finer implements must be used. In cheaper straws less care needs to be used, and the bag may be inferior so far as the efficaciousness of the method at the moment is concerned. Unvulcanized rubber bags are used for felt hats.

Indispensable as the rubber hat bag is considered to be by the largest straw manufacturers, there is a vague idea that it will be some day greatly improved or else superseded. In the first place it is expensive, and capital is consumed at a rapid rate in the outfit. Each manufacturer buys as few as possible, but it can readily be seen that too much economy in this direction would interfere with the rapid handling of labor. The process of riveting the rim to the rubber is a slow one comparatively, and considering the great number of hats that have to be made in a factory, it is not speedy enough. Then the wear and tear of the bag is a discouraging factor. A bag often goes to pieces the first time it is put in the press, while some last a month. The reasons for this are manifold. Steam, when used, is very destructive to rubber, and the bag often gets over-vulcanized. The cement at the junction of the crown and rim is sometimes faulty, and the bag gives out at that point. The rivets tear the rim to pieces if care is not used. The circumferential rim on the press will destroy the edge of the bag, if care is not used. Then workmen are ignorant of the constituents of rubber, and will neglect the care of the bag when not in use, or put it to uses for which it was not intended.

In the unvulcanized bags they will become overcured and rotten, falling to pieces. Some manufacturers line the costly bags with the unvulcanized, which is claimed to be an advantage. The vulcanized bag is thus protected by one which costs one-quarter as much, and the unvulcanized gradually becomes vulcanized where steam is used. Unvulcanized rubber is used also for patching, manufacturers undertaking to repair their bags, which they do with more or less success.

The rubber hat bag industry is not a large one. Few companies care to have anything to do with it, as it is a specialty in which great care and skill have to be exercised with, after all, variable results. Peculiar as it may seem, many rubber men never heard of the rubber bag. A leading manufacturer the other day confessed his ignorance of the subject, except that he had thought they were the covers used by coachmen for their hats in rainy weather. In another place a dozen salesmen guessed at what they might be like, the subject being entirely new. One of the largest concerns in the country made a few, and did well with them, so far as a good article was concerned, but they quickly abandoned the business after the first batch. It is an article which ought to receive the attention of the inventor, for if it could be improved, the principle could be applied to many other manufactures than that of the straw hat industry.—*India Rubber World.*

The Arrow Poison in the New Hebrides.

M. Dantec has examined and experimented with the arrow poison used by the natives of the New Hebrides. He finds that it contains neither vegetable poison nor serpent virus, but consists of earth impregnated with vegetable matter taken from marshy places and containing Pasteur's *vibrion septique*, or bacillus of malignant œdema and also the bacillus of tetanus. If the arrows have been kept a long time, or have been much exposed to the sun, the *vibrion septique* may have been destroyed; the danger then is from tetanus. When the arrrows have been freshly prepared and the *vibrion septique* is still active, a wound from them causes death in a guinea pig from septicæmia in from twelve to fifteen hours; tetanus, which takes longer than that period of time to develop, does not under these circumstances show itself. It is interesting to remark that the horse is unknown in these islands, consequently the theory of the equine origin of tetanus would seem to be negatived by these researches.—*Lancet.*

Detection of Frozen Meat.

The process adopted by the author for distinguishing between fresh meat and that which has been preserved in the frozen state consists in expressing a little blood or meat juice from the sample, and examining it under the microscope. The whole operation must be performed quickly, in order to prevent any drying up of the liquid under examination. When the juice of fresh flesh is thus examined, it is seen to contain numerous red corpuscles, which are normal in color, and float in a clear serum. In the case of blood from frozen flesh, the corpuscles have dissolved in the serum under the influence of the low temperature, and not a single normal red corpuscle can be seen. The hæmoglobin escapes into the serum, and appears as irregular yellow-brown crystals. These may be frequently seen by the naked eye, but, in every case, can be readily detected under the microscope.—*Maljean, in J. Pharm. Chim., Chem. Zeit.*

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AN IMPROVED NECK YOKE.

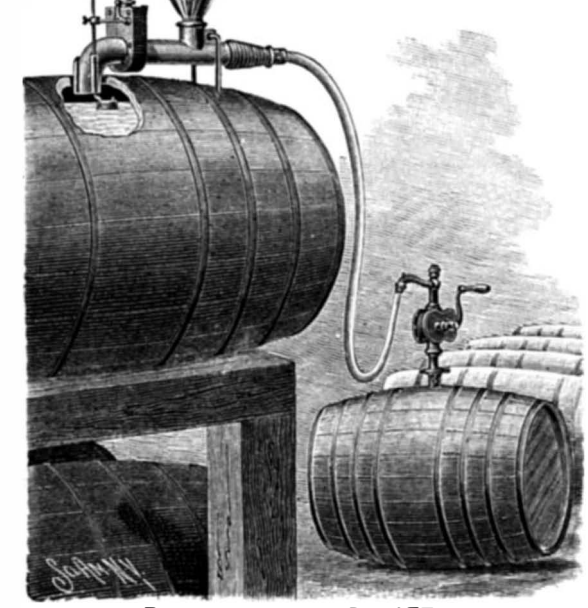
The simple harness attachment shown in the illustration is mainly designed for securing the breast straps to the neck yoke, although capable of other uses. It has been patented by Mr. Lewis W. Rothrock, of Morrisdale Mines, Pa. As shown more in detail in the small view, the attachment consists of a ring having parallel arms, supporting a roller removably held in position by a bolt, there being on the bolt a loose sleeve slightly longer than the roller, preventing the binding of the arms against the roller. The device is light and strong and saves the breast straps from wear.

ROTHROCK'S NECK YOKE ATTACHMENT.

AN IMPROVED LIQUID-MEASURING DEVICE.

The measuring draw cock, with its connections, shown herewith, affords convenient means of filling vessels of different sizes and kinds, and automatically cutting off the delivery when the supply reaches any desired point in the receiving vessel. The improvement was patented August 30, 1892, by Mr. Jacob Roos. The draw cock body is preferably made in two parts to facilitate its manufacture, and at the junction of the two parts is a vertical slideway for the liquid-controlling gate, an upwardly extending rod from which terminates in a ball weight. The discharge nozzle has on its vertical portion three ribs, and a plate spring, serving to keep it erect when inserted in a bung hole. On the front side of the guide box in which slides the liquid-controlling gate is pivoted a bell crank lever, a laterally projecting toe from the upright member of which is adapted to enter a notch in the rod extending upward from the gate, to hold the latter in elevated or open position, and in a vertical perforation in one of the ribs on the spout slides a triggerrod, on the lower end of which is an inverted cup, forming a float. The upper portion of the trigger rod is adjustably connected with the horizontal member of the bell crank lever, the rod being vertically adjusted to set the float at the point to which it is desired the liquid should rise in the receiving vessel. When a cask or other vessel is to be filled, the float is set as desired, and the gate is raised, the rod extending upward from it being engaged by the lever; but, when the liquid rises sufficiently to raise the float, the lever is rocked by its engagement with the trigger rod, and the gate is dropped to cut off the flow of the liquid automatically. An inlet, threaded to receive a screw plug, in the longitudinal passage of the body, provides for the introduction of liquid to the cask through a funnel when so desired. A pair of prop legs, at the rear of the inlet, may be inserted slightly in the cask when necessary to afford support to the draw cock body near the funnel. The device may thus be used to safely fill any vessel, or partly fill it, cutting off the flow according to its adjustment, and thereby serving as a measure of quantity or as a safety tapping faucet.

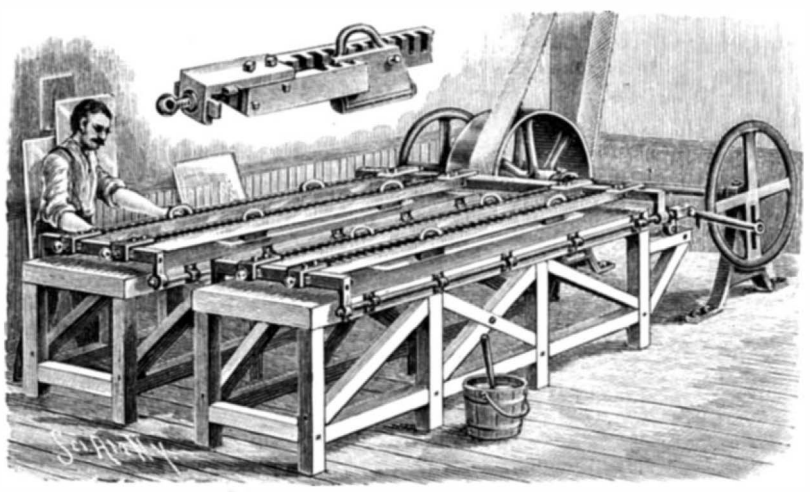
Further information relative to this improvement may be obtained of Messrs. D. Rich & Co., who are agents therefor, at No. 22 Park Place, New York City, where also the apparatus may be seen in operation.



ROOS' FILLING APPARATUS.

AN EFFICIENT GLASS-POLISHING MACHINE.

A machine for polishing the beveled edges of plate glass is shown in the accompanying illustration, its construction being designed to increase the capacity of such machines and reduce the cost of labor. The connecting rods from the crank wheels of the drive shaft are connected with a transverse rod, and with the latter are connected longitudinally ranging guide rods having bearings in brackets at the sides of two beds on which the glass to be polished is laid. At each end of these guide rods are secured vertical brackets or standards supporting cross bars on which are held laterally adjustable longitudinal rubber-carrying bars. An end view of one of the rubber-carrying bars, with a rubber in position, is shown in the small view, the bar having at each end an overhanging angle iron with a set screw for clamping it in position, and the bars being longitudinally slotted and having vertical recesses to receive the studs of the rubbers. The beds are far enough apart to afford a passageway between them, so that one attendant can conveniently examine and attend to the inner rubbers of each bed in addition to having the usual access to the outer rubbers. In large work the plates may be placed on both tables, bridging the passage, the rubbers being then removed from the central bars, or the bars being bodily removed. The frame carrying the rubbers is reciprocated from the drive shaft through the connecting rods, and the single machine with one attendant is designed to perform the work of two machines and two attendants.

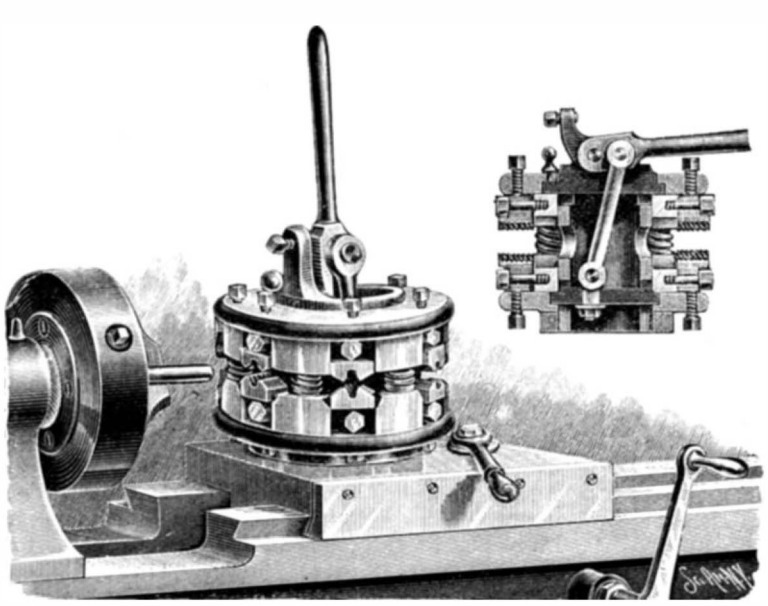


MAXIMILIAN'S GLASS-POLISHING MACHINE.

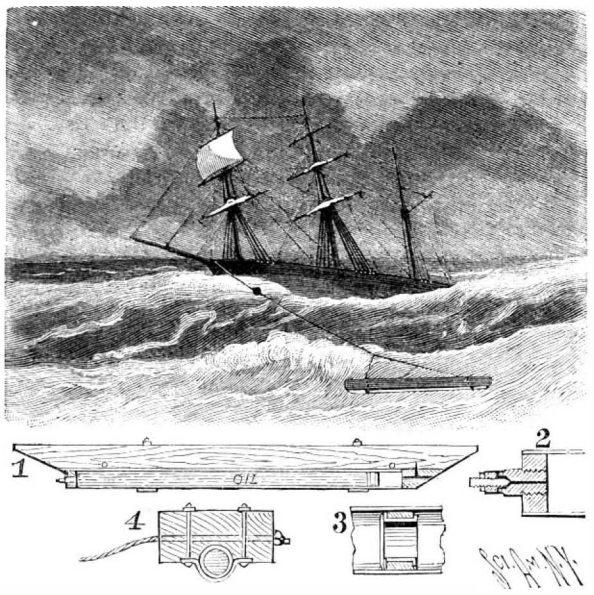
Further information relative to this improvement may be had of the patentee, Mr. Ferdinand K. Maximilian, at Jacques Kahn's, Nos. 27 to 31 Bleecker Street, New York City, where the machine may be seen in operation.

AN IMPROVED BOLT-THREADING MACHINE.

The screw-cutting die head, or bolt-threading machine, shown in the illustration in perspective and in section, is the invention of Mr. James A. Becher, of Mishawaka, Ind., and has been patented in the United States, Canada, and Great Britain. The head, shown closed in the perspective view, is used for heavy as well as for light work, and can be made to carry a dozen sets of dies or more, as desired. The turret die carrier, having opening and closing jaws, is mounted on suitable standards secured to a lathe or screw-cutting machine spindle in such a manner that the axis of the turret is transverse with its axis of rotation. The turret jaws may be opened and closed at any stage in the work without stopping the machine, and the jaws may be rotated to bring any pair of the series of the cutting dies into operation, and concentric with the axis of rotation of the lathe or screw-cutting spindle. The same device may be used as a revolving head by dispensing with the lever and adding some extra mechanism to open and close the head while in revolution, making a reliable and labor-saving machine for light work from one inch down. With this turret no time is lost by backing out of dies after thread is cut, and the machine requires one less pulley on line shaft, and one less belt between line shaft and counter, than usual, dispensing also with friction clutch. Further particulars in regard to this improvement may be obtained of the patentee.



BECHER'S REVOLVING-TURRET BOLT-THREADING MACHINE.



PRESCOTT'S APPARATUS FOR DISTRIBUTING OIL UPON WATER.

A DEVICE TO DISTRIBUTE OIL ON WATER.

A device whereby oil may be distributed upon the water around a vessel, to modify the force of the waves, is shown in the illustration, and has been patented by Mr. Sidney I. Prescott, of No. 154 Tompkins Avenue, Brooklyn, N. Y. The device is shown in section in Fig. 1, and consists of a float made of wood, or wood and cork, to the underside of which is secured an oil tube having at one end a valve, shown in Fig. 2, which may be adjusted to feed the oil more or less rapidly. Near the other end of the tube is a piston, shown in Fig. 3, capable of sliding the length of the tube, the end of the tube outside of the piston being wholly open to or having a channel communicating with the sea water, which acts upon the piston to force the oil through the valve at the other end of the tube. The distributer is towed by the vessel to distribute the oil as desired, the attachment of one of the lines to the float being shown in the sectional view, Fig. 4. A weight is designed to be bent into a bight of the tow line a short distance from the ship, to serve when desired as a governor in cross seas.

Improvement of Aluminum.

An account of a process invented by Reinhardt Mannesmann for increasing the resistance of aluminum to atmospherical, chemical, or mechanical influences is given in the *Moniteur Scientifique*. The inventor says that the addition of a little tungsten to pure aluminum or its alloys communicates a remarkable resistance to the action of cold or hot water, salt water, and other reagents. When the proportion of tungsten is sufficient, the alloys formed offer among other physical properties great resistance to traction and tension. The proportion of tungsten can be varied within extremely wide limits, according to the composition and nature of the alloy, and according to the usage for which it is destined. The tungsten can be added, alloyed with other metals; still the most advantageous way consists in adding the tungsten before the aluminum is melted.

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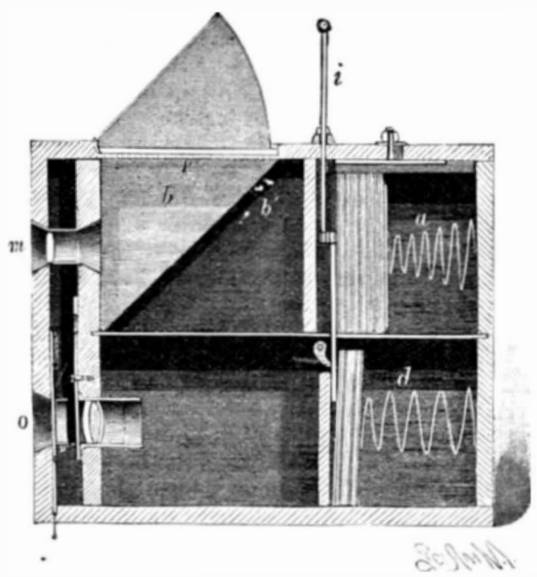
IMPROVED HAND CAMERA.

The German edition of "Experimental Science" contains the following description of a magazine hand camera, invented by Dr. Krugener, which differs in some respects from the one described recently in the SCIENTIFIC AMERICAN. It has a large finder, which includes the same area as the plate upon which the impression is taken. The finder lens is above the view



IMPROVED HAND CAMERA.

lens, and the plates are transferred before the impression is taken instead of afterward, as in the camera above referred to.

A mahogany case of convenient form is divided into four compartments by horizontal and vertical partitions. Division *b* contains a mirror, *b'*, placed at an angle of 45°, which throws the image formed by the lens, *m*, upon the ground glass, *p*, so that during the taking of the impression the position of the object may be observed. Division *a* contains from 12 to 24 sensitive plates, firmly pressed by a spiral spring, by which they are moved forward, when one of the plates in division *d* is shifted by means of the transferring rod, *i*, so that it may receive the light from the object glass, O. The next plate moves in front of the one already exposed. Every plate is fixed in a small shield, so that the forward plate protects all those behind it from the injurious influence of the light. The object glass is closed independently of the shutter. The instantaneous shutter is placed in a compartment in front of the objective, and is therefore out of sight and protected from injury. It has been suggested as a further modification of this camera that the finder lens may be a duplicate of the view lens, so that by arranging the box to permit of the exposure of two plates simultaneously, the instrument may be converted into an efficient stereoscopic camera. In this case it would, of course, be necessary to shift two plates for each double exposure.

ROGERS' COLD FORGING PROCESS FOR WOOD SCREWS.

A patent was lately granted to Charles D. Rogers, of Providence, R. I., for a cold forging process for making wood screws. By the Rogers method the finished screw head, including the slot, is forged upon the end of the wire from which screws are produced, a piece of wire of the size required to form a screw being cut off and pointed by compression between dies, the thread being forged thereon by rolling the piece between the dies. The ribs of the dies at the commencement of their operation penetrate the metal to the required depth and then force the metal by lateral compression to expand radially and give the required form to the thread.

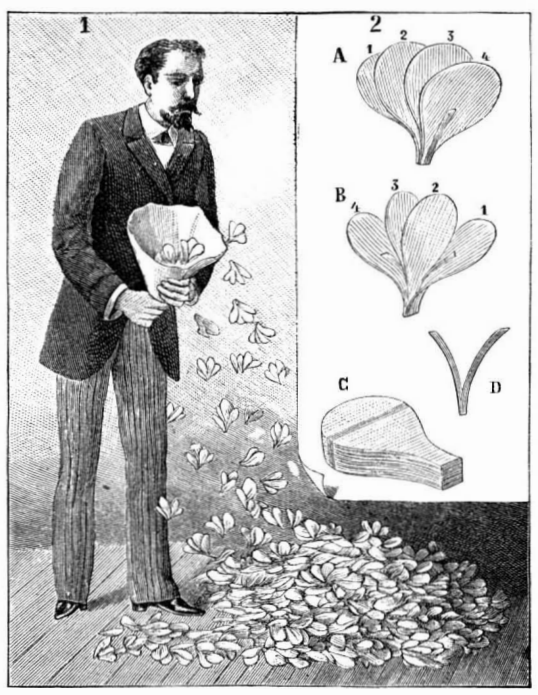
During a recent visit to the works of the American Screw Company, at Providence, R. I., we were shown this process, the 11 small cuts illustrating every stage from the wire in the coil to the finished screw. The operation necessary to complete the screw from the finished screw blank No. 5, Fig. 1, to the finished screw No. 11, Fig. 2, being made by one movement of the working surfaces (Fig. 3) of the dies for forming the thread on the screws.

In the old process of cutting the threads on the screw, which was brought to a state of perfection by this company, it was necessary to run the cutters over the surface of the screw a number of times to complete the thread; as the new process completes the thread in one movement, it will be seen that in speed alone the new process is a long step in advance. When the additional advantages of the superiority of the new screws over the old are considered, it will be seen that Mr. Rogers' invention forms a great improvement in this manufacture.

Starting with Fig. 1, No. 1, the plain wire is fed automatically from the coil of wire by the machine, and Nos. 2, 3, 4 and 5 show the effect of the successive blows given the same piece of metal in the heading machine. From a manufacturer's standpoint this is very important. There is no waste. The head of the screw is much stronger than when made in the old manner, and the shank is tapered from the head to where the thread begins.

Nos. 6 to 11, Fig. 2, show the work of the thread-forging dies and clearly illustrate how all of the metal is left in the screw, none being wasted, and show also how the thread of the screw is raised until it is larger than the shank where the thread begins, being as large as the shank at its largest point, where the head commences. This gives the screw a much firmer hold in the wood, and enables the head to fit snugly. The screws are stronger than those made by the old process, the forging making the material denser, while by the process of cutting away the metal to make slots in the heads and threads the screws are weakened in proportion to the depth of the threads and width of the slot. By this process also the wire used may be several sizes smaller than the finished screw.

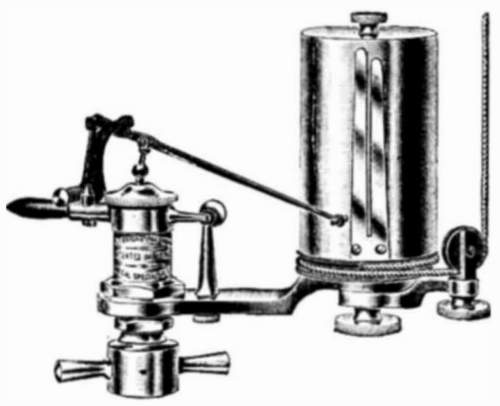
The progress made in the manufacture of wood screws from 1846 to the present time is shown in Fig. 4. Tests have been made which show that screws made by this new process with a rolled forged surface have greater strength to resist the torsional strain of a screw driver than cut screws of the same size, made from wire of the same material and of larger diameter. The danger of splitting the wood where these forged screws are used is much less, as the diameter of the threaded part is greater than that of the unthreaded part.



THE CONE OF FLOWERS.

At a recent legal trial in London where the validity of Rogers' invention was questioned, Judge Romer in his decision said, "I see no ground in the evidence before me for believing that the defendant has not *bona-fide* and independently constructed a machine of his own which he has reason to consider original."

The American Screw Company are equipping their various factories, three in Providence, R. I., and one in Hamilton, Ontario, with these new forging machines as rapidly as possible, and are advised by cable that the trials of their machinery at Paris have been highly satisfactory to the parties who propose to work the foreign patents, while the British Screw Company, Limited, has been operating its plant at Leeds, England, for several weeks with very satisfactory results.



HINE & ROBERTSON'S STRAIGHT LINE INDICATOR.

STRAIGHT LINE INDICATOR.

A new indicator, in which a pencil, by means of a very simple mechanism, is made to move in a straight line, is shown in the illustration. It is made by Messrs. Hine & Robertson, of No. 39 Cortlandt Street, New York City. This movement is effected by means of a parallel motion, and an auxiliary spring that holds the parts in such relation to each other that the wear comes continually upon one side of the surfaces, thereby preventing any appearance of back lash. The superiority of this indicator is due to these two features, for this construction permits of lightness in the moving parts and accuracy in the guiding mechanism.

The guiding mechanism consists of a small cam fastened to the pencil arm, the face of the cam being held by a spring against a roller. The roller has a fixed bearing on the upright, and the cam which rocks upon the roller is so shaped as to cause the pencil point to move in a straight line. The guiding mechanism is placed near the fulcrum of the tracing lever to prevent high surface velocity of the cam. This construction enables the machine to trace a line parallel with the axis of the drum. The drum is made very light, and is provided with a bearing at each end. Special attention is given to the fitting of the piston and in other details of the mechanism. Engineers who have used this indicator speak highly of it.

THE CONE OF FLOWERS.

In prestidigitation flowers have in all times played an important part, and they are usually employed in preference to other objects, since they give the experiments a pleasing aspect. But, in most cases, natural flowers, especially when it is necessary to conceal their presence, are replaced by paper or feather ones, the bulk of which is more easily reduced. Such is the case in the experiment which we are about to present, and which, it must be confessed, requires to be seen from some little distance in order that the spectators may, without too great an effort of the imagination, be led into the delusion that they are looking at genuine flowers. However, even seen close by, our trick surprises one to the same degree as all those that consist in causing the appearance of more or less bulky objects where nothing was perceived a few moments previous.

The prestidigitator takes a newspaper and forms it into a cone before one's eyes. It is impossible to suppose the existence here of a double bottom, and yet the cone, gently shaken, becomes filled with flowers that have come from no one knows where. The number of them even becomes so great that they soon more than fill the cone and drop on and cover the floor.

The two sides of the flowers employed are represented in Fig. 2, where they are lettered A and B. Each flower consists of four petals of various colors, cut with a punch out of very thin tissue paper. Upon examining Fig. A, we see opposite us the pe-

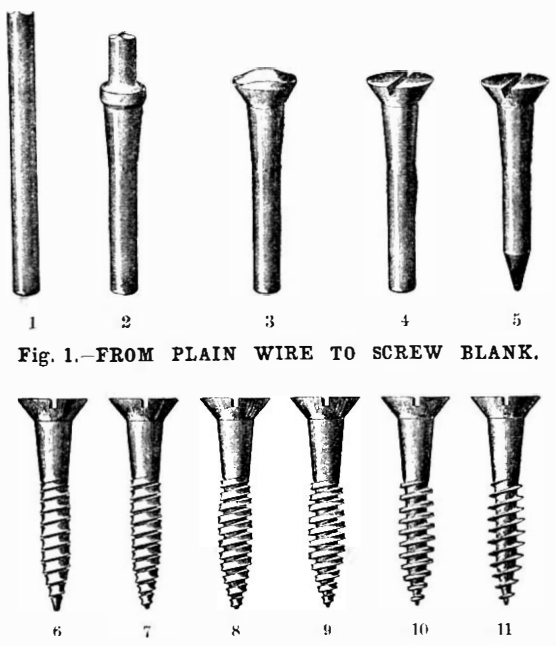


Fig. 1.—FROM PLAIN WIRE TO SCREW BLANK.

Fig. 2. FROM THE BLANK TO FINISHED SCREW.

Fig. 3.—SCREW FORMING SURFACE OF DIE.

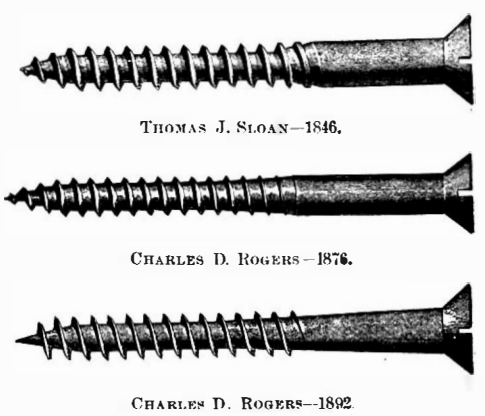


Fig. 4.—PROGRESS IN WOOD SCREWS—1846 TO 1892.

MAKING WOOD SCREWS.

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tals 1 and 2 and 3 and 4 gummed together by the extremities of their anterior sides, while Fig. B shows us the petals 2 and 3 united in the same manner on the opposite side. A small, very light and thin steel spring, D, formed of two strips soldered together at the bottom, and pointing in opposite directions, is fixed to the two exterior petals, 1 and 4, of the flower and is concealed by a band of paper of the same color gummed above. It is this spring that, when it is capable of expanding freely, opens the flower and gives it its voluminous aspect.

Quite a large number of these flowers (a hundred or more), united and held together by means of a thread or a rubber band (Fig. 2, C) makes a package small enough to allow the operator to conceal it in the palm of his hand, only the back of which he allows the spectators to see while he is forming the paper cone.—*La Nature.*

THE WORLD'S COLUMBIAN EXPOSITION.

As the time approaches for the dedicatory ceremonies next month of the World's Fair, the full programme of which was printed in last week's SCIENTIFIC AMERICAN, increasing public interest in the great enterprise is being manifested in many directions. The financial problems affecting the exposition have now been definitely settled, and it is assured that ample means have been provided to make the fair the great success which was promised when it was decided to hold it in Chicago. The long struggle to obtain an appropriation of five million dollars from Congress at the last session had, it would seem, a most happy ending, as Congress substituted for the proposed loan of $5,000,000 an appropriation of $2,500,000 in souvenir half dollars. The demand for these coins justifies the expectation that the sale of them will realize at least $4,000,000, and none of it will have to be paid back. Large sums will be obtained by the sale of privileges. At the Centennial many fortunes were made by those who dispensed refreshments and provided various auxiliary entertainments. The Chicago directory have knocked every concession down to the highest bidder, and have in each case exacted heavy bonds. It is even reported that the man who secured the exclusive right to sell peanuts, for example, paid the amazing sum of $120,000. All these sources of revenue have been looked after with a good deal of business shrewdness.

The vast grounds and buildings have for the past month presented an especially animated spectacle, as the work has been pushed with remarkable vigor in all departments to have everything in as complete a state of forwardness as possible for the dedicatory ceremonies, the force of mechanics and laborers having been increased to 10,000. The building of roads and paths has been rapidly approaching completion, walks and flower beds being laid out on the terraces along the grand basin, and the completion of the Manufactures Building, in which particular interest is centered, is in sight. There is no doubt of its being in readiness for the ceremonies. The steelwork of the roof is completed, and the carpenters and staffmakers are as close upon the ironworkers as possible. The artists who will decorate the interior of the domes over the entrances are now busy at their portion of the task. Work on the main building of Machinery Hall is being pushed. The placing of the ornamental staffwork has also begun, and the foundations for the boilers and engines in the power house are being placed.

The exterior of the Administration Building is practically completed, with the exception of the coloring and placing of free groups of statuary. Artist Dodge is at work on the statues for the decoration of the outer dome. The figures in this work will be thirty feet high. On each side of the mammoth memorial fountain in front of the Administration Building will be a huge electrical fountain, throwing a stream 150 feet high, brilliantly illuminated by variously colored electric lights.

Active work on the Transportation Building's annex will begin shortly. The roof of this annex constitutes a terminal for the elevated railroad. Building work has been begun on two annexes for the Fine Arts Building. Contracts are let for the stock pavilion and excavations for the foundations are begun. Work will soon begin on the Photographic Building. The big plate glass tanks in the aquaria of the Fisheries Building are nearly completed, and it is expected that some of the fish will be placed in them this month.

The dedication exercises are to be held in the Manufactures Building, where accommodations for seating 80,000 people will be provided. The programme provides for the presence on this occasion of President Harrison, Vice-President Morton, the members of the Cabinet, the judges of the United States Supreme Court, the governors of the forty-eight States and Territories, the ministers of foreign nations resident at Washington, the Chicago board of forty-five directors, the one hundred and six national commissioners, and scores of Congressmen and Senators.

The state of forwardness of some of the great buildings of the fair is accurately shown in the pictures given, which are from recent photographs. Around the Woman's and Horticultural Buildings large steam rollers have been at work packing down the permanent crushed stone roadways and paths, and the landscape work around these two buildings is nearly finished. A large rookery is to be placed in the central dome of the Horticultural Building. The design for the Woman's Building was made by Miss Sophia G. Hayden, of Boston, who won a $1,000 prize offered for the best plan. The structure measures 200 by 400 feet, and cost $200,000. The architecture is classic, with end and center pavilions, connected by an arcade. The center pavilion contains the main entrance to the building, from which the visitor enters the main gallery, 60 by 240 feet, to the left of which is a room 80 by 200 feet, in which there will be a retrospective exhibit, while a similar space at the other end of the building will be devoted to reforms and charities. Portions of the building are also allotted for a model kindergarten, a model hospital, a library and record room, a bureau of information, club rooms, committee rooms, parlors, etc. The main portion of the building is three stories high.

The Palace of Fine Arts occupies a space of 320 by 500 feet, and to the rear, on each side, will be an annex, reached by a covered passage, each of these additional buildings covering a ground space of 120 by 200 feet.

The Electricity Building covers a space of 700 by 350 feet, or more than five and one-half acres. It was designed by Messrs. Van Brunt & Howe, of Kansas City. Like most of the other buildings, the style of architecture is Italian Renaissance. It is 60 feet high and ornamented with designs suggestive of the department. It is one of the handsomest of the grand central group, and will cost $650,000. There will be four entrances to the building, the main one on the south. Its staff covering will cause it to resemble granite in color. A statue of Franklin will rise conspicuously before the south entrance.

The Horticultural Building, facing the lagoon on the land side, is 1,000 feet long and with an extreme width of 286 feet. It was designed by W. L. B. Jenney, of Chicago, and in front will be a flower terrace for outside exhibits, including tanks for nympheas and the Victoria regia, while the front of the terrace will have a low parapet between large vases bordering the water, with a boat landing at the center. The building will have a central pavilion and two connected end pavilions, forming two interior courts each 88 by 270 feet, the courts being beautifully decorated in color and planted with ornamental shrubs and flowers. The center pavilion will be roofed by a crystal dome, 187 feet in diameter and 113 feet high, under which will be exhibited tall palms, bamboos, and tree ferns. The exhibits will include all the varieties of flowers, plants, vines, seeds, horticultural implements, etc., those requiring sunshine and light being placed where the roof is entirely of glass, while provision will be made for furnishing heat where required. The exterior of the building will be in staff or stucco. The appropriation for this building is $400,000.

The Fish and Fisheries Building was designed by Mr. Henry Ives Cobb, of Chicago. It has an extreme length of 1,100 feet, and its width is 200 feet. The building is subdivided into three parts, to conform to the shape of the site. In the central portion will be the general fisheries exhibit. In one of the polygonal buildings will be the angling exhibit, and in the other the aquaria. The exterior of the building is Spanish-Romanesque, and will contrast agreeably in appearance with the classic style of all the other buildings.

World's Fair Notes.

In the interest of foreign exhibitors the government Treasury Department has agreed to have some one appointed at every port of entry to look after exhibits sent to Chicago. It will be the duty of these agents to forward without delay or appraisement exhibits regularly consigned to transportation companies. This concession was never previously secured for an exposition in this country. The plan will greatly facilitate the shipment of exhibits, for the agent will be charged with the further duty of looking out for all goods not regularly consigned. In all cases where exhibits are not properly consigned, and on which freight charges have not been prepaid, the agent will care for them without cost to the exhibitor or the exposition company until arrangements can be made for forwarding them to Chicago. The Treasury regulations provide there will be no customs duty or charges exacted from exhibitors, but it has always been customary for charges to be made by custom house brokers for blanks and clerical work at the port of entry. This charge the railroads in whose care exhibits have been consigned will assume, and the exhibitor will thus be saved a cost ranging from $3 to $10 on every shipment.

A separate building for the shoe and leather industry exhibit is now an assured fact, as the required $100,000 has all been raised. Leather dealers and manufacturers in all parts of the country have contributed to the fund.

An international congress of charities, correction and philanthropy will be held at the World's Fair, to consider questions relating to the care of criminals, paupers, and unfortunates. The congress will begin June 12, and last one week.

The New York State Board of Charities is preparing an industrial exhibit of the products of the charitable, corrective, reformatory, and eleemosynary institutions under its supervision. The exhibit will contain photographs, models, illustrations, of the various methods of instruction, statistics, and a comparison showing the progress of work for the past twenty-five years.

The German exhibit will contain an architectural display including drawings illustrating 200 or more of the most notable buildings in the empire.

The Baltimore and Ohio Railway Company will make a historical exhibit which will be of absorbing interest to all railroad men. Major J. W. Pangborn has charge of its preparation. The Baltimore and Ohio claims to be the oldest railroad in the world, its two or three predecessors having been mere tramways for transporting coal, stone or ore. The actual construction of the road began on July 4, 1828, and its first section was in operation six months before the Liverpool and Manchester road, the first railroad, in the present sense of the word, in Europe. The Baltimore and Ohio claims also to be the only one of the pioneer roads which has retained its original name and has remained under a continuous succession of management.

The Austrian wood-carving industry will be represented by thirty-four expert wood carvers from Vienna, who will exhibit their work in its various branches.

Plans for the passenger station at Jackson Park call for a main building, 150 × 300, with an annexed train shed, 100 × 672. Provision is made for loading and unloading thirty-six trains at one time.

A gold brick worth $230,000 will be exhibited by Montana.

The Mont Blanc Observatory.

It may be remembered that M. Janssen, the director of the Meudon Observatory and member of the French Institute, who last year made the ascent of Mont Blanc, in order to examine the practicability of the scheme for establishing an observatory there, finding that at 40 feet below the surface of the snow there was no solid bed of rock for the foundations of a building, conceived the idea of constructing one which could be kept in its place by the snow itself. He accordingly formed an association, to which Prince Roland Bonaparte, M. Leon Say, M. Raphael Bischoffsheim, Count de Greffulhe and Baron de Rothschild were liberal subscribers, and the funds thus obtained were spent in the construction of an observatory which, after having been put up in the grounds of the Meudon establishment, has been taken to pieces again and sent off to Chamounix, from which place it will be taken up to the summit of the mountain and put together under the supervision of M. Capus, the well known explorer, who accompanied M. Bonvalot on his journey through Central Asia and over the Pamir into India. The new observatory is of timber and is about 25 feet in height, being divided into two compartments or stories, surmounted by a square platform, with an iron balustrade and a wooden scaffolding for the reception of the various meteorological instruments. There are several rooms in each compartment or story, for the use, upon the one side, of the director and his staff, and, upon the other, of tourists and their guides. These rooms will be provided with barrack furniture and with small stoves for heating and cooking purposes, the fuel used at first being anthracite. The two stories communicate with each other by means of a spiral staircase, while there is a straight ladder with a trap door, giving access to the room for the guides. Ventilation is provided for by means of tubes, while the windows of the upper story, with double framework and double panes of glass, afford views in various directions, among others toward Chamounix, with which it is intended to communicate by means of semaphorical signals when the atmosphere is sufficiently clear. All the timber has a thick coat of fireproof paint, and each piece of wood is numbered so as to facilitate the observatory's being easily put together—a work which, it is hoped, will be completed by the end of September. It remains, of course, to be seen whether the building will, as M. Janssen anticipates, remain in its place by the simple process of letting the planks which are to form the outer walls down some distance into the hardened snow.

REFERRING to our recent article on the American black wolf, Mr. F. H. Peorman writes that "the black wolf is not by any means extinct; that they exist in large numbers in Alaska, and that other animals extinct, or nearly so, in the States and other Territories are in good preservation in Alaska." Among these he mentions the black fox, the gray or silver-tipped fox, the red fox, and the bald-faced bear, so called because his face is the only bare portion. He states that a black wolf was killed about a year ago near Douglas City.

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Correspondence.

A New Comet.

To the Editor of the Scientific American:

On the morning of August 28, while searching the eastern sky, I discovered a new telescopic comet in the constellation Auriga. Its position at the time of discovery was right ascension 5 hours 59 minutes; declination north 31 degrees 52 minutes.

Subsequent observations show that the comet has a slow motion eastward, or toward the sun.

It is not a difficult object in the 10 inch equatorial, and a short, faint tail is visible.

WILLIAM R. BROOKS.

Smith Observatory, Geneva, N. Y., Sept. 1, 1892.

The Famine in India.

To the Editor of the Scientific American:

In your issue of June 18 is an article by Dr. Van Allen, of the American Madura Mission, on the subject of the distress which has lately prevailed in the Madras presidency.

Any one reading this article would suppose that this distress was similar to that of the great famine of 1876–78, to which Dr. Van Allen compares it.

The severity of a famine may be measured by the area over which it extends and by the intensity of the distress within that area. As regards the first point, in 1876–78 the distress extended over sixteen of the twenty-one districts into which the Madras presidency is divided, the only districts which escaped being those in which famine is practically impossible, namely, the two "west coast" districts, in which the rainfall in the worst years is sufficient to prevent serious scarcity, and the three which are protected by the great irrigation works of the Godavery, Kistna, and Cauvery deltas.

The present (or I ought rather to say the late) famine has extended to only eight districts, and in three of these it has been so slight as hardly to deserve the name of famine at all.

As to the intensity of the distress within the area affected, the best test is the number of laborers attending the relief works which are opened to provide employment for the distressed population.

The largest number employed over the whole presidency at any one time during the last year has been 91,000; in no single district has the number ever reached 30,000; in two it has reached 20,000, and in two others 10,000.

In 1877, in the single district the works of which were then under my charge, the numbers exceeded 200,000, or more than double the number for the whole presidency during the last year; and though I have not at hand the figures for the whole presidency, I believe that they exceeded 2,000,000.

Toward the end of 1877 the weekly increase in numbers exceeded 100,000.

Dr. Van Allen says that this year's rains have failed, and that another year of famine is in prospect. His letter having been published in New York on the 18th of June, could not have been written much later than the middle of May. Considering that the rains of the "southwest monsoon" are not due in the south of India till the latter end of June, and those of the "northeast monsoon" till the end of October, there is a certain amount of audacity about the assertion that the rains "have failed" in the middle of May.

As a fact, so far from the rains having failed, the southwest monsoon has been this year above the normal average, and the famine is practically over. In three districts relief works have been stopped altogether, and in all others the numbers employed are falling rapidly, having diminished by about one-half during the last five weeks.

I am afraid that one of the leading Madras papers is right when, in commenting on Dr. Van Allen's article, it describes him as possessing a "somewhat hysterical imagination." J. P.

Ootacamund, August 2. 1892.

P. S.—It might be worth your while to ask Dr. Van Allen when the group which is reproduced by you was photographed. I and some others who have seen the paper think we recognize an old friend of 1877.

Bacteria in Hailstones.

The *Johns Hopkins Hospital Bulletin* recently received some observations by A. C. Abbott upon the bacteria found in the interior of large hailstones which fell during the storm of April 26, 1890. Care was taken to exclude all organisms except those brought down from the altitude where the hail was formed. The number of organisms observed ranged from 400 to 700 to the cubic centimeter. The majority represented only a single species—a short, thin. oval bacillus—though several other undetermined species were observed. These observations suggest possibilities. Medical men are often asked to account for the origin of sporadic cases of disease well known to be contagious—scarlatina, for example—where the source of infection is impossible to trace. A cyclone may have swept through an infected region; clouds of dust containing the bacillus of the disease in question may have been carried to a height, borne along for hundreds of miles, incapsuled in hail stones or rain drops, and brought again to the earth in a location favorable to their growth.

SEARCHING FOR SUNKEN GOLD NEAR HELL GATE, NEW YORK.

For several weeks a dredging company organized in Gloucester, Mass., has been endeavoring to locate a great quantity of British gold. This gold lies at the bottom of Long Island Sound, under 90 feet of water, just above Hell Gate, near New York City. The amount of money is reported to be not less than $5,000,000, and has been quietly reposing at the bottom of the Sound for more than 100 years. The details of the sinking of the Hussar, a British war ship, with this large quantity of money and seventy American prisoners of war on board, are very interesting, but would occupy too much of our space to be repeated here. It is sufficient to say that the dredgers have located the sunken vessel, over which the tides of 100 years have washed a tremendous quantity of sand and debris, and have already brought to the surface a number of pieces of money, some human bones, pieces of iron, steel, and copper, and other fragments of the vessel. The method of searching employed by the diver at the bottom of the sea is shown in the accompanying illustration, for which we are indebted to the *Electrical World*. A powerful incandescent lamp protected by a double globe, and connected by a strong insulated cable to a generator on the wrecker above, furnishes the light for this submarine work. Casting this light before him, the diver prowls around among the rocks and seaweed of the bottom, and explores the remains of the old wreck with almost as much ease as if he were in the light of day above, and not buried under ninety feet of water. Although previous attempts have been unsuccessful, the present company is determined to prosecute the work, and keep the diver and his light below until his search is rewarded by the glitter of the long-lost treasure.

A SUBMARINE SEARCH LIGHT.

The Drawing Frame.

Drawing or doubling is the operation through which the cotton has to pass after it has been carded. The ends, bands, or slivers, as they come from the card, are exceedingly tender and loose, the fibers of cotton not being yet arranged in the parallel form requisite for good spinning. Before any twist is given to the bands, the fibers should be in a proper position for the manufacture of smooth yarn. The doubling and drawing out of the bands, which accomplishes this perfectly, is done on the drawing frame. Some drawing frames are constructed with three pairs of rollers, and some with four pairs; the latter having the advantage of doing more work in the same time. The rollers in a drawing frame are generally so adjusted that the drawing is done between the first and third rollers, the middle roller having but little influence on the result so far as the stretching is concerned. Where there are three or four rollers, the drawing is performed twice: each pair of rollers draws a certain amount. The distance between the rollers is so adjusted that the longest fiber of the cotton does not reach from the center of one roller to the center of the other: this prevents the rollers from tearing the fibers, because the first pair of rollers pulls the fibers, while the second holds them fast.

If, on the other hand, the distance between the rollers is too great, the filaments of cotton separate in unequal thickness, and the result is unequal yarn. It is more preferable to have the rollers too close together than to have them too far apart, provided they are always so far distant as not to injure the staple. The principal object to be attained in drawing the bands is to reduce their thickness after they have been doubled. Doubling and drawing effects the twofold purpose of stretching the fibers of cotton and equalizing the bands. The more a band is doubled and eliminated, the more perfect should be the yarn spun from it; but this process of drawing can, nevertheless, be carried too far. Excessive drawing, as well as excessive picking and carding, tends to weaken the fiber, and finally renders it brittle and rotten.

Still, if the machinery is kept in such perfect order as not to injure the cotton, it may be considered impossible to eliminate the fibers to too great an extent. The sliver from the last drawing head should be of a silky luster, and its component fibers should lie perfectly parallel with the band and with each other. But little cotton is wasted in this operation; the waste consists principally of those parts which have to be broken off in consequence of their running singly, or when the attendant, through negligence or inadvertence, misses a can, and gets behindhand with the rollers.—*Baird's Cotton Spinner.*

The Trolley Electric Car.

As an alternative to horse cars it seems to have some merit. It is certainly far less unsightly and cumbersome than an elevated road. Beyond question it is far more cleanly and healthy in its operation and surroundings than either a horse railroad or an elevated steam road. We should suppose it had some superiority over a cable road as being less costly to build and operate, with greater control of the cars, and at least an ability to back a car instantly when necessary. We have understood that a great many electric roads have re-endowed many American citizens with their birthright—a free home—enlarging the area of prosperous municipalities and building up beautiful suburbs where the humblest may sit under his own veranda and apple tree.

It is a stange sensation for a New Yorker, like ourselves, to come back to the city after visiting other places blessed with electric roads, and to settle down to the old humdrum horse cars. A trip two weeks ago to Scranton showed us a city with not a single horse car in it, but with electric cars in every direction used as freely and gladly by the people as though they had been there since the year in which the city was founded. Or, if one has been in the Northwest, he will have visited Minneapolis, where the electric cars last year carried 26,500,000 passengers, and where this year the travel on the electric lines is many per cent heavier than in 1891. Or perhaps we may take the report of Boston, where on the Fourth of July over 600 electric cars carried hundreds of thousands of people in comfort and safety. The annual report of the West End Company of Boston, just published, shows that electricity is there doing a work that no other motive power could have done, and that the trolley has been patronized by the public to such an extent as to make the stock of the company one of the best investments to be found in that staid and shrewd city, an investment, moreover, that is pretty well distributed among the proletariat of capitalists constituting the conservative element of the community. If the trolley is a failure in Boston, as some of our New York newspapers contend, the price of the stock, the rapid extension of the electric system, and the demand for trolley roads where none have yet been put in, are good evidence to the contrary.

By all means, let us have every storage battery car we can; and conduit roads, too, when we may; and underground roads as soon as possible; but their development and the general cause of rapid transit are not going to be benefited one bit by dispraise of one of the simplest and greatest inventions of the age—the humble, useful trolley. The trolley is here to stay.—*Electrical Engineer.*

Professor Carl Schorlemmer.

Dr. Carl Schorlemmer died at Manchester, England, after a prolonged illness, on June 27th. Born at Darmstadt about 1834, Schorlemmer died at the comparatively early age of 58, respected and beloved by all who knew him. Few chemists possessed such an extensive knowledge of the literature of his subject, combined with so thorough an acquaintance with the practical side of his subject. He thus seemed to be specially marked out for writing a treatise on chemistry. The great work on "Chemistry" bearing the names of Roscoe and Schorlemmer is not yet completed, and, in view of his death, it is doubtful if the last volume will be written, since the work necessary to complete it came within his special province.

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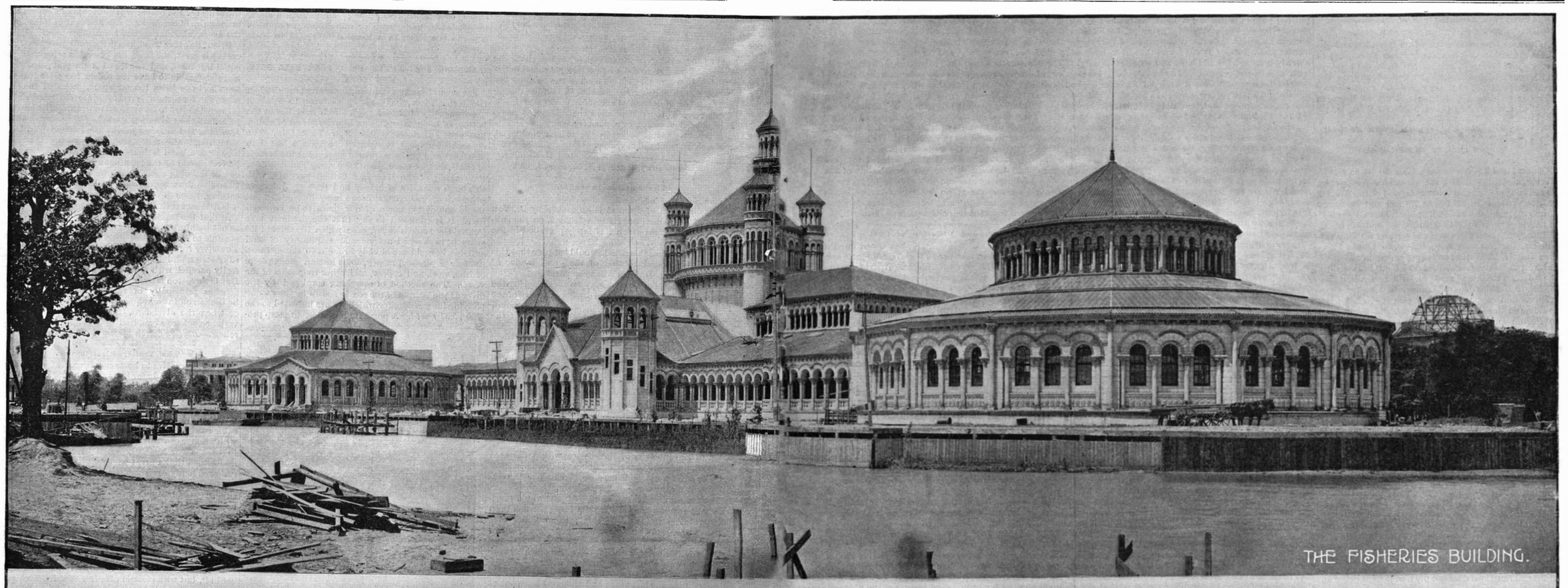

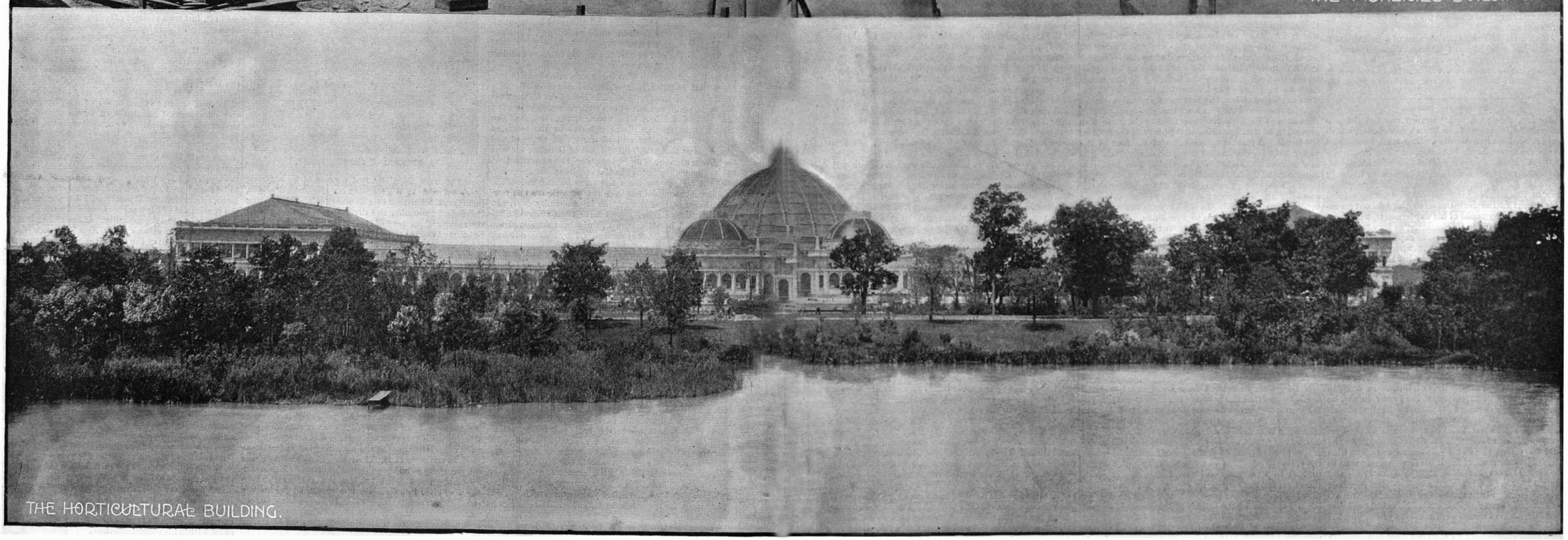

WORLD'S COLUMBIAN EXPOSITION—PRESENT APPEARANCE OF BUILDINGS.

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RECENT DECISIONS RELATING TO PATENTS.

By the Commissioner of Patents.

WEBSTER *vs.* PARKHURST AND HAM.

Where one has conceived of an invention and discloses the essence of it to another whom he employs to develop and perfect it, suggestions from the employe in the course of experiments and dependent upon the main idea will not ordinarily give the employe any rights as an inventor. (Citing O'Reilly *vs.* Morse, 15 How., 62, and Agawam Co. *vs.* Jordan, 7 Wall., 583.)

U. S. Circuit Court of Appeals—Ninth Judicial District.

NORTON *et al. vs.* JENSEN *et al.*

Hawley, J.:

Claims 1 and 2 of letters patent No. 267,014, to Edwin Norton, November 7, 1882, for a machine for putting on the ends of fruit and other cans, and claims 6 and 7 of letters patent No. 274,363, to Norton and Hodgson, March 20, 1883, for a can-ending machine, and claim 14 of letters patent, No. 294,065, to Norton and Hodgson, February 26, 1884, for a can-ending and seaming machine, and letters patent No. 322,060, to Edmund Jordan, July 14, 1885, being an improvement on the original Norton machine, sustained and *Held* infringed by the "Jensen machine" made under letters patent No. 376,804, to Mathias Jensen, January 24, 1888, for a can crimper and capper. Letters patent No. 307,197, to Edmund Jordan, October 28, 1884, and No. 307,491, to Norton and Hodgson, November 4, 1884, for machines of the same class, *Held* not infringed.

It is the duty of courts to construe a patent by a reference to the language of its claims and an examination of the specifications and drawings accompanying the same.

Where an invention is of a primary character and stands at the head of an art, it is entitled to a liberal construction of its claims, and all persons who make devices or machines operating on the same principle and performing the same functions by analogous means or equivalent combinations, even though the machine may be an improvement of the original and patentable as such, are to be treated as infringers.

An infringement takes place whenever a party avails himself of the invention of the patentee without such a variation as constitutes a new discovery.

When a combination patent covers a new arrangement of old elements, producing a new and useful result, the same may be protected by invoking the doctrine of equivalents, as against the substitution for any particular element of a different device known at the date of the patent as a means of performing similar work; and the fact that the substitute performs some additional functions does not prevent it from being an infringement.

There cannot be any infringement of a combination claim unless every element of the combination or a mechanical equivalent of an omitted element is used.

The opinions of experts are admissible in evidence in patent cases; but they are not conclusive upon the courts.

Prehensile Babies.

Monday, August 8, was "monkey day" at the Anthropological Section of the British Association, which was crowded on the occasion. The most sensational paper was by Dr. Louis Robinson, on "The Prehensile Powers of Babies." He regretted that he could not reproduce his experiments in public, because he had only arrived in Edinburgh on the Sunday. Next day, however, in the microscopic room of the anthropological department of the New University he laid out an exhibition of photographs of his experiments, which exhibition was unique in its character, as may be gathered from his account of what those experiments were.

Dr. Louis Robinson said that when carrying her young the mother ape required all her limbs for climbing, especially so when she had to traverse the branches rapidly in escaping from a foe. The young one, therefore, must hold on by its own strength, and it was plain that every infant ape which failed to do so would fall to the ground just at a time when the fall would be most dangerous to life. That a young child had an inclination to close its hands upon anything which touched the palm was a fact which had been noted by many, although no one appeared to have associated the instinct with the remarkable development of the muscles of the shoulder, girdle, arm, and forearm, especially the latter, at the time of birth. In order to test the power of gripping in the young infant, he placed his fingers against the palm, having first divested the child of all superfluous clothing. The contact at once caused the hand to close apparently by pure reflex action, since it made little difference whether the child was asleep or awake. He then slowly, but with a slight jerking motion, lifted his fingers, and found to his surprise that the child tightened its grasp and allowed him to raise it from the bed, so that its whole weight depended from the hold of its hands. This experiment was performed with a considerable number of babies, some of which were absolutely new, with the same result.

He then determined to time the performance with his watch, and having taken all precautions by way of putting pillows or having a blanket stretched by assistants below the embryonic gymnast, he let him hang as he would. To the astonishment of the experimenter and witnesses, it was found that in many cases a newly-born child would hang and support its weight with ease for a minute, and some 30 seconds longer. Several infants of under a week old hung for over a minute and a half; a few others of a fortnight old for nearly two minutes, and one child of about three weeks old for 2 minutes 35 seconds. In many cases he was convinced that loss of temperature, rather than exhaustion, caused the babies to quit their hold, since they would renew their grasp and allow themselves to be lifted immediately after falling. He had himself tried hanging to the bar, and by the time a minute was up his arms were thoroughly exhausted. Of course, it would not be fair to pit a trained gymnast against a newly-born infant. Still more surprising was the fact that in most instances, if the child were in a good temper to begin with, it would make no objection to the experiment whatever, and would hold quite placidly without a cry or grimace of pain until its fingers began to slip, when it at once evinced distress and screamed lustily, as from a fear of the consequences of falling. Indeed, it was quite evident that many of the little creatures felt quite at home in this pendent state of existence. Several proved themselves capable of hanging by one hand, and in two instances the children grasped his finger firmly, and absolutely allowed themselves to be lifted up while asleep. He then handed round for the inspection of the audience a number of photographs of infants hanging from the branch of a plum tree in his garden, with a piece of braid wrapped round it to keep the tiny hands from the cold, rough surface of the bark.

With material so plentiful as it was—for he had seen several babies since coming to Edinburgh—he ought, perhaps, to have demonstrated the facts he had brought forward with living specimens. He begged them to forgive the omission on account of the lack of time, since he only arrived in Edinburgh on the previous day, and he knew, of course, that it would be quite useless to endeavor to enter into any contract with an Edinburgh infant on the Sabbath. When they considered the generally feeble condition of the muscular system in the newly-born, this remarkable strength and efficiency of the flexor muscles of the digits appeared altogether phenomenal. From their efficiency at birth they would seem to have to do with some habit of vital importance to the babe. Yet they found that among the newly-born offspring of the human race they were of no use whatever. It seemed, therefore, legitimate to infer that the astonishing prehensile power in the hands of the modern infant was a surviving vestige of the habits which for many epochs, compared with which the whole stretch of historical time was but a moment, saved their aboreal forefathers during their tender youth from destruction. He noticed during his experiments that all infants when hanging by the hands drew up their knees and sprawled their toes about. This suggested to him to place some graspable object against the sole of the foot near the toes, and he found that at once the little creatures tried to clasp the toes around it, as if endeavoring to supplement the hold of the hands. A further examination of the foot of the young babe suggested that it was much more hand-like in character than that of the adult. The toes were more mobile, the hallux being especially free in movement. Frequently the great toe was bent across the sole after the fashion of a thumb, so that it almost touched the fifth digit. In most infants the outer and inner toe could be made to touch one another with ease with a little assistance from the observer. He took some pains to ascertain if the various lines and creases on the infantile foot were constant in different individuals, as those of the hands were. He had obtained about 500 prints from babies' feet, and had ascertained that although there was a certain range of variability, the chief lines were present in all cases. Broadly speaking, these pedal markings were the same in the higher anthropoid apes as in the child, but in the orang-outang, owing to the small size of its great toe, had been placed somewhat differently. He was not aware that any explanation could be given of those lines so characteristic of a prehensile organ on the foot of the human infant other than that they were vestiges of an aboreal state of existence.

If they were descended from an arboreal being, it seemed plain that the babies of the earliest earth dwelling men were lean and spare, like young apes. Speaking of the plump condition of babies, Dr. Robinson continued that during the recurrence of times of stress among savages, the babe at the breast would be deprived of its natural food, for it could not make use of the coarse food which in the case of the older savage sufficed to keep body and soul together. It must, therefore, fall back upon its own private store of adipose tissue until times improved, and another deer or bison was slain by the hunter of the clan. It seemed probable, considering the universality of the obese and rotund habit of body among our little ones, that the pressure brought to bear by dire necessity was very sharp and long-continued. For long ages during the epoch of absolute savagery all the lean, ape-like infants were eliminated, and only those which varied in the direction indicated survived the ever-recurring periods of starvation, and became our ancestors. These naturally would tend to produce offspring similar to themselves, and so the condition had become habitual. They saw then that when a proud mother showed them the chubby, round limbs of her baby, they had before them the record of an appallingly terrible amount of human suffering written as plainly and indelibly on that tiny plump baby as if recorded on tablets of granite by the graver of a truthful historian. Furthermore, the smile of the infant and his convulsive mouth, when tickled, revealed to them strange and dark chapters in the early history of the race. In conclusion, he said that they had with them, within their very doors, an animal as interesting as any which had been brought by the pioneers of zoological research from the uttermost parts of the earth.

The Origin and Diffusion of Cholera.

Surgeon-General Cornish, C.I.E., has contributed a paper to the current number of the *New Magazine* on the Origin and Diffusion of Cholera. Apart from the obvious interest which the subject possesses at the present time, when European countries are threatened with the prospect of a new cholera invasion on a large scale, the paper merits attention from the fact that its author has acquired a practical knowledge and experience of the disease in the East from the official position he held in India. Allusion is made, first of all, to the great value of the late Mr. J. Netten Radcliffe's labors during his lifetime in having conscientiously chronicled and recorded the facts about the progress and geographical distribution of epidemic cholera from year to year, whenever that disease overflowed the limits of its natural home in the great river deltas of Lower Bengal and India. Reliable information from health officials regarding the progress of epidemic cholera is essential to a correct judgment regarding the liability of any particular area to invasion. So far as can be gathered, Surgeon-General Cornish says, the epidemic which now threatens the whole of Europe appeared in March or April of the present year in the northwestern provinces of India, attacked with great violence the pilgrims at the great Hurdwar fair, near the source of the Ganges, spread through Cashmere and Afghanistan, reached Persia in May or June, crossed the Caspian Sea and spread among the population of Asiatic Russia, from whence it is making rapid progress in European Russia. The epidemic since April has traveled in a northwesterly direction and has covered or overflowed many thousands of square miles of territory. The history of the progress of the great epidemic of cholera of 1829–33 should be closely studied by those who wish to understand the significance of the present epidemic. Cholera history is very apt to repeat itself, and the circumstances which happened in 1831 are therefore very likely to happen again in 1892 and succeeding years. The route taken by the present epidemic is almost identical with that which invaded Europe in 1831. It is quite a mistake to suppose that since India is the natural home of cholera the disease is everywhere present there and ready to take an epidemic form. An epidemic of cholera follows the same laws in India as in any other country. It is endemic only in certain and limited parts, from which an epidemic advances occasionally, with intervening intervals of uncertain duration. Its progress is influenced by season and atmospheric conditions, and after lasting a period of about three years the epidemic dies out. Surgeon-General Cornish questions whether the cholera in the suburbs of Paris, with its peculiar and circumscribed topography and weak infective power, can be attributable to the same cause as that which has invaded and is now advancing in Russia. He alludes to that country's half civilized acquisitions in Asian soil as a source of difficulty and danger in this direction, and considers that, as far as the safety and happiness of her people are concerned, the wealth now spent on the maintenance of a huge army and on ambitious schemes for extension of territory would have been more efficiently laid out in the improvement of the sanitary and social condition of the populations under her rule. As regards land quarantine and sanitary cordons, which European nations are so ready to enforce against their neighbors, these have never been successful in keeping out cholera. In India, with ample military aid at hand, they have been tried again and again unsuccessfully. The only provisions on which any reliance can be placed are sanitation, a good water supply, efficient drainage, surface soil cleanliness, wholesome food and habitations. The invading cholera, if it does not reach this country in the present autumn, is, in Surgeon-General Cornish's opinion, likely to do so in 1893. Happily, the early accession of cold weather has apparently had the effect, to which he alludes, of repressing the progress of the disease for the present. The moral of this matter lies on the surface. What we have to do in the meantime is to seek out and repair the weak places in our sanitary harness.—*Lancet.*

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IMPROVEMENT IN ARRANGING CUT FLOWERS.

At several of the exhibitions of the Royal Horticultural and Botanic Societies various groups of cut flowers, arranged on a new principle, have attracted much attention. These groups are in the form of a cone or pyramid, the only evidence of a containing vessel being the edges of a flat plate, which appear here and there where not concealed by the border leaves of the group. It is clear that, except by the use of soft plastic clay, it would not be possible to produce these effects in any ordinary vessel. But as clay is not without its inconveniences, a special kind of vessel has been invented by Mr. March, in the form of a solid dome or hemisphere, in which are sunk numerous tubular orifices, upright in the center and gradually diverging outward till they approach the horizontal.

This vessel rests on a separate plate of glass, terra cotta, etc., of wide diameter and nearly flat, but capable of holding sufficient water to refresh the border leaves of the group, which form a distinct feature in this kind of decoration. The plate is sometimes placed on a flat circle of dark Utrecht velvet. Flowers and leaves inserted in the tubes take the exact inclination desired, and the design can thus, as it were, be sketched out and studied as the work proceeds. This system gives the power of forming artistic groups, in which characteristic foliage takes a far greater part than is usually assigned to it in floral arrangements. In the case of wild flowers, for instance, primroses, bluebells, digitalis, campanulas, and others, according to season, are intermingled with grasses, ferns, bramble, and other beautiful foliage which can be found in every hedgerow. For an aquatic group, water lilies are appropriately mixed with forget-me-nots, rushes, arrowhead (see illustration), and other leaves of water plants, while stove and greenhouse flowers are appropriately treated with foliage which thrives in a warm temperature.

The smaller domes are best adapted to table decoration, as the flowers do not rise to an inconvenient height, but some of the tubular holders are made of large size for the display of massive subjects, such as sun flowers, peonies, hollyhocks, hydrangeas, branches of flowering trees and shrubs, large ferns, rushes, and pampas grass. These are not easily arranged in ordinary vases, but placed in the wide and deep tubes of such flower stands they form striking decorative objects, having all the better effect for irregularity of outline, which gives a bold character to the grouping. The main and commendable idea of the invention is to avoid overcrowding and to give to each spray of leaf or flower its separate and distinct meaning.—*The Garden.*

IMPROVEMENTS IN THE ARRANGEMENT OF CUT FLOWERS.

Molasses as Fuel.

The low price of common molasses some year or more ago led the *Planter* to urge its distillation into alcohol, and at the same time one of its correspondents suggested its use as fuel, and the suggestion attracted wide attention at the time, and several inventors had in hand apparatus that they believed would be successful in burning molasses if it were to be used as fuel.

Molasses is now as low or lower than ever, two cents per gallon hardly being obtainable for it. Of heavy-bodied molasses 166⅔ gallons will weigh a short ton of 2,000 pounds. This would make full cost $3.33 per ton on the plantations, and rather less per ton than current prices for coal delivered there.

The question would then arise as to the fuel value of molasses. As it is almost altogether carbonaceous matter, it must have a considerable fuel value, but its relative merits, as compared with bituminous coal, we have no data at hand to determine. Heavy bodied common Louisiana molasses contains say 20 per cent water, 8 per cent ash, 12 per cent gums, and 60 per cent sucrose and glucose. Hence we have 72 per cent of carbonaceous matter available as fuel, and only 20 per cent of water. This would certainly make excellent fuel if there were competent devices to burn it, such as are used for liquid fuels.

Molasses has recently been used for fuel in Cuba, and with seeming success. It was there poured or sprayed on to the bagasse as it entered the furnace, and the judgment of those interested was that its efficiency as fuel, when used in this way, was incontestable.

Our grinding season is now approaching, and if our inventors and engineers will take the matter in hand, they may be able to soon demonstrate the actual money value to us as fuel of this seemingly worthless by-product.

The molasses product of Louisiana for 1892 will probably reach 120,000 tons, and if of equal value with coal, it would represent 120 boat loads of 10,000 barrels each. Most of it is yet too valuable to use as fuel, but the constant tendency of our molasses is toward low grades, and year by year less of it is consumed as food. We need new outlets for it, and its possible use as fuel promises relief.—*La. Planter.*

Educational Progress in New Mexico.

BY H. C. HOVEY.

Organized as a Territory in 1850, New Mexico has knocked in vain for admission to statehood, although other Territories have been admitted with a third her population and with inferior natural resources. Her singular loyalty to the Union during the last war, her rapid development of mines and agriculture, the unanimity of her citizens for recognition in the sisterhood of States, and other arguments that might be mentioned, have thus far been outweighed by the alleged illiteracy of her people. Without taking sides in the controversy, it is but fair that I should give certain facts, recently gathered from the most authentic sources, and that may be new to some of my readers.

The tourist finds, to his surprise, at Albuquerque, Raton, Eddy, Deming, Springer, Roswell, Silver City, Kingston and Hillsboro, many of the best elements of American society, such as he would expect to find in cities of like size in Ohio or Indiana. He dines at excellent hotels, on whose tables not one Mexican dish appears; finds business blocks as pretentious as those in similar Eastern cities; handsome churches, club houses, and charming modern residences with the latest conveniences. At Santa Fe, Las Vegas and Socorro, the old and new are strangely intermingled. But a short ride from any of these places brings one into what is practically a foreign country. Stately country seats, whose inmates boast true Castilian aristocracy and refinement, are surrounded by mud cottages occupied by peons, too contented with their ignorance and poverty. Then, there are the romantic Pueblos, remnants of an ancient pagan civilization, dwelling in nineteen villages, and owning 906,000 acres of farm land, a peaceful, home-loving race, ruled by officers of their own choosing, just as they were when the country was discovered. The total population, American, Mexican and Indian, amounts to only 153,206, in a territory of 122,444 square miles. It is as though the citizens of Hartford and New Haven were scattered abroad through New England, New York and New Jersey, the only denizens of that broad area, in settlements as widely apart as Cape Cod and Malone, Hoboken and Eastport. What a task to unify, govern and educate such a people!

All legal business, every lawyer's plea, the testimony of every witness, and the findings of the courts, must be rendered into Spanish in order to be understood by the common people. Until very lately Spanish was the only language used in three-fourths of the schools of the Territory. And yet, amid this anomalous state of affairs, there are signs of evident progress. This forward movement is largely due to the work done by what is known as "The New West Education Commission," having its headquarters in Chicago, but extending its operations for the upbuilding of non-sectarian schools throughout all the Territories. The honor must be shared, of course, with the various denominational schools. There are 600 students in the Catholic colleges at Santa Fe, Las Vegas, Taos and Mora, and about 2,000 more in their parochial institutions. There are 3,375 pupils in the various Protestant schools and academies.

Amado Chaves, the superintendent of public instruction, is a native Mexican, but highly educated, and enjoying the confidence of all sects, races and parties. He requires the English language to be taught in all common schools, and he insists that no teacher shall be employed who has not been previously examined and declared to be competent. The new legislation was originated as long ago as 1884, but was inoperative for lack of funds. This defect was remedied in 1890, and ample provision made for supporting an efficient system of public instruction, which went into actual operation only last November. Since then, as officially reported, there have been enrolled 45,775 children of school age, of whom 22,599 are in the public schools and 6,137 in those that are denominational or private. The first public school in the Territory was erected last year at Las Vegas, at a cost of $20,000; another has been built at Raton, costing $7,000; other expensive ones are being erected at Deming and Albuquerque. Besides the government training schools, of which it is not my purpose to speak more particularly, there are four Territorial institutions, viz., the University at Albuquerque, the Agricultural College at Las Cruces, the School of Mines at Socorro, and the institution for the deaf and dumb at Santa Fe. It must be added that in many of the public schools the terms are short and the salaries inadequate. But the outlook is extremely hopeful, and the general sentiment seems to have been voiced in the noble words of Ama do Chaves, who says: "The public school is the greatest product of the four centuries of American civilization. No other institution is so universal, and no other lies so close to the hearts of the people." All this is highly encouraging, and if the educational work now begun should be diligently pressed forward, it cannot be long before New Mexico will gain a worthy place as one of the sisterhood of States.

A Horse with a Tube in its Neck.

For half an hour one afternoon recently, a crowd surrounded a truck which had halted in front of the Exchange Place door of the Mills Building. Attached to the truck was a horse, and there was a peculiarity in the animal's appearance which had caused the crowd to gather.

The horse was doing its breathing, not through its nostrils, but through a tube inserted in its neck. The contrivance looked very much like an old-fashioned candlestick with the base and an inch or two of the shank showing. In the tube was a sort of a filter, to catch impurities in the air which passed through it, and the arrangement appeared to work very satisfactorily.

The driver explained that tracheotomy had been resorted to to save the life of the horse, which had suffered from asthma. The tube had been in use for several months, and the horse appeared to be as well as ever. It was certainly able to do its full share of work. Every two or three days the tube was taken out and cleaned, but the horse had it in its neck the rest of the time.—*N. Y. Times.*

PETER WENDOVER BEDFORD, Ph.G., professor emeritus of the College of Pharmacy of the City of New York and founder and editor of the *Pharmaceutical Record*, died July 20, while in attendance on the meeting of the American Pharmaceutical Association, at the Profile House, White Mountains, N. H. He was born in Johnsville, Dutchess County, N. Y.

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The British Association.

Professor Lodge advocated the creation of a national physical laboratory. His idea was that the amateur would, as at present, start lines of research and carry them on till they became unwieldy, but that at that stage, instead of dropping them or leaving them for the Continent to continue, our own national laboratory should take them up.

GEOLOGY OF PALESTINE.

Professor E. Hull gave a description of the "Physical Geology of Sinai and Palestine." The expedition, the results of which he communicated, started from Egypt, passed through the desert to Moses' Wells, thence through the Sinaitic Peninsula, along the Gulf of Akaba, and through the Araba and Jordan Valley to the foot of Mount Hermon. The most remarkable fact noticed by the expedition was the existence of terraces, showing that at one time the Dead Sea had risen to the level of the Mediterranean, the Jordan in the glacial period forming a lake 200 miles long.

THE COLOR OF ANIMALS.

The influence of food and surroundings on color was illustrated in a paper by Mr. E. B. Poulton on the colors of lepidopterous larvæ. Several members of a large brood of caterpillars of the pepper moth were exhibited which had been reared under different conditions. Those which had been confined among green leaves and twigs became green, those which had had black and brown twigs mingled with their food were brown or black, while others which had been reared among spills of white paper had made a pathetic attempt to imitate their surroundings. Experiments with artificial colors showed that both blue and red tended to produce a dark coloration, especially the former, while, strangely enough, painted twigs did not produce the same effect as those whose tints were natural. Mr. Poulton was able to show that the sensory stimulus producing the change did not act through the eye, as in the case of the chameleon, frog, and sole, but through the skin. It consists, moreover, in the formation of definite pigment, and hence is not so rapid as in those animals. It is possible to modify the color of a caterpillar only once or twice in its lifetime.

THE HABITS AND POWERS OF SPIDERS.

The Rev. Dr. M'Cook read a paper on "The Social Habits of Spiders," in which he criticised the observations of Dr. Simon, from which that observer had concluded that certain spiders were social in their habits. Dr. M'Cook said that all spiders were solitary in their habits, and that the discovery of a social species, if confirmed, would be most important. The appearances which led Dr. Simon to the hypothesis of a social habit might, in default of further observations, be interpreted by the phenomena commonly observed to occur in the history of many common forms. Lest the audience should think too hardly of spiders, he might mention that there really were cases in which the male and female lived in amicable relations for a considerable period.

He discussed the capability of spiders as weather prophets. He mentioned that this belief was as old as the time of Pliny, who stated that when a river was about to rise, the spiders in the neighborhood built their webs at a greater elevation, and that it seemed to have been almost universally believed. He concluded, from his own observations, that there was no ground for the theory.

ARABIA.

In description of a recent journey in Yemen, Mr. Walter Harris said that, although by most people Arabia was considered to be a desert, he had found that Yemen, at least, was a country of magnificent fertility. The great plateau lying at an elevation of from 7,000 to 9,000 feet above the sea level was in a state of excellent cultivation. Water was by no means scarce, in fact, in many places there were rivers of no inconsiderable size. Although the journey had been made once or twice before, he was probably the first European who had reached Sanaa from Aden.

Artificial Ivory.

Natural ivory under analysis shows albumen, gelatine, alumina, magnesia, calcium carbonate, and tribasic phosphate of lime. By this process quicklime is first treated with sufficient water to convert it into the hydrate, but before it has become completely "slaked" an aqueous solution of phosphoric acid is poured upon it, and while stirring the mixture the calcium carbonate, magnesia, and alumina are incorporated in small quantities at a time; and lastly, the gelatine and albumen, dissolved in water, are added. The point to aim at is to obtain a compost sufficiently plastic and, as intimately mixed as possible. It is then set aside to allow the phosphoric acid to complete its action upon the chalk. The following day the mixture, while still plastic, is pressed into the desired form in moulds, and dried in a current of air at a temperature of about 150° C. To complete the preparation of the artificial product by this process, it is kept for three or four weeks, during which time it becomes perfectly hard. The following are the proportions for the mixture, which can be colored by the addition of suitable substances: Quicklime, 100 parts; water, 300 parts; phosphoric acid solution (1·05 specific gravity), 75 parts; calcium carbonate, 16 parts; magnesia, 1 to 2 parts; alumina precipitated, 5 parts; gelatine, 15 parts.

RECENTLY PATENTED INVENTIONS.

Electrical.

REMOVING ARMATURES.—Stephen H. Sharpsteen, Honesdale, Pa. To quickly and conveniently remove the armature from between the field magnets for inspection or repair, carrying the armature and its support independent of the usual bearings, with safety to the operator, is the object of this invention. A track extends through the dynamo between the magnets and above the armature, being supported at opposite sides of the dynamo, and traveling hangers on the track have vertically adjustable hooks to hook under the ends of the armature shaft, whereby the armature may be lifted and carried away.

FIRE ALARM TELEGRAPH.—Andrew J. Coffee, Portland, Ore. This improvement relates more especially to fire alarms in which auxiliary boxes are used in connection with main district signal boxes, and provides means whereby the exact auxiliary that has been turned in may be located, the boxes not interfering to cause confusion. The invention comprises a controller having operative electrical connections with a signal box, auxiliary boxes in series electrically connected with the controller, manually operated means for setting the controller mechanism, with automatic locks therefor. The mechanism is easily operated, and a return signal is provided at the auxiliary box, so that any one bringing in an alarm may know that everything is in good working order.

TROLLEY CARRIAGE FOR CONDUITS.—Stephen L. Platt, Elgin, Ill. This is a wheeled carriage adapted to be engaged by the car hanger, a contact wheel being journaled in spring-pressed bearings in the carriage. The slotted conduit or duct supports the conducting wire and rails arranged within it, on which travels the carriage having a wheel in contact with the wire, and the whole construction is simple and durable, and not likely to get out of order.

Mechanical.

SAW TOOTH.—John W. Todd, Portland, Ore. This is an improved removable tooth for circular saws, having a shank and point seated in the saw blade, and its outer edges formed partly on a segment of a different circle than the seat in the saw blade, the end of the shank adjacent to the point having a spring part pressing on the point to hold the latter on its seat. The tooth may be conveniently inserted or removed from the blade, as desired, for sharpening or other purposes.

TOOL.—Charles E. Harris, Saxton's River, Vt. An attachment for hammers and hatchets is provided by this invention, consisting of a piece having a threaded shank, a pointed prong, and a knife, the shank fitting in a screw-threaded socket in the end of the handle, where it projects through the hammer or hatchet, in combination with which the tool is designed to be used in shingling, clapboarding, and similar work.

KNIFE BLADE MACHINE.—Thomas R. Moore, Walden, N. Y. This machine has parallel oscillating rolls geared together between their ends and provided with opposed dies, in combination with a spring-actuated lever, a gear wheel on the lever-actuated roll, and a locking and tripping mechanism for locking and unlocking the gear and roll. The machine is strong and durable, and designed to rapidly work strips of metal to the right shape for finishing, all the pieces of metal being shaped alike.

GLOBE VALVE.—Frank M. Moore, Spreckelsville, Hawaii. This invention provides a novel improvement in the securing nuts and in the valve itself, to facilitate the grinding and reseating of the valve. The construction is such that the packing gland and packing will not be unduly affected either by the ordinary operation of the stem or in regrinding, and the valve may, by removing the nut, be restored to perfect condition at a trifling cost.

ROLLER MILL SCRAPER.—John Harvey, Brooklyn, N. Y. This patent covers an improvement upon a former patented invention of the same inventor, by which the vertical adjustment of the scraper strip under the roller is facilitated, and the operator may bring the exact degree of pressure upon the roller needed to cause the strip to remove compacted crushed grain from its surface, and whereby also the scraper strips may be used until they are almost entirely worn away, besides affording improved means for securing the strips in place below the rollers.

CONVEYER.—Pinkney C. Wilson, Patterson, La. This invention relates to cane mill conveyers, for carrying the crushed cane from one mill to another, or for the conveyance of bagasse, the conveyer adjusting itself automatically, according to the quantity of material to be conveyed. The improvement consists of a sprocket chain carrying knives and passing over sprocket wheels, of which one is mounted in fixed journals and the other in journals carried by pivoted arms.

Agricultural.

CHURN.—Geo. S. Agee, Willow Springs, Mo. This churn is made with an angular rocking frame, pivoted at its angle to a support, there being a foot treadle at the lower end of the vertical member of the rocking frame and a dasher shaft clamp on the outer end of the horizontal member, whereby a swinging treadle is formed to operate or actuate the dasher by the foot. The invention also includes a specially constructed dasher and other novel constructions and combinations of parts.

CELERY DIGGER.—Maurice M. Ranney, Comstock, Mich. This is a simple and inexpensive machine, the shovel of which may be given any desired draught and lowered to any depth for cutting the roots, while the sides or mould boards may be adjusted upon the bottom to take any thickness of dirt required from the sides of the celery being dug. The implement may be used for hilling purposes as well as for digging.

Miscellaneous.

TYPE WRITER.—Analdo M. English, New York City. This is a simple, very inexpensive, and conveniently operated mechanism, taking up but little more space upon a desk than an inkstand, and with which any one not an expert can readily make a type written letter or other copy. The letters and characters are on the top of a small revoluble disk, and a small knob opposite each is moved to a depression centrally in foont of the operator to make the impression, the carriage then being moved along the space of the letter by a finger piece. The letter or character may be seen as soon as printed, and the register is perfect, the carriage being moved back the length of a line, when another lever is pressed upon. The paper is shifted by hand for line spacing by a simple paper-holding clip, which enables one to write upon ruled paper, when desired, with great facility.

WASHING MACHINE.—Silas P. Lowell, Eugene, Oregon. The suds box of this machine is circular, and in its bottom is mounted a revoluble disk, on which are upright perforated tubes and a central perforated cylinder, through which water may be passed to the clothing to be washed. The cleansing is effected, as the disk is revolved, by a middle or central rubbing against the tubes, and also by a further rubbing between the tubes and upright side ribs on the inner side of the suds box.

PORTABLE PASTRY RACK.—Charles F. Jesser, Staunton, Va. This device consists of a suitable supporting frame, to which is pivoted a series of laterally movable receptacles, adapted to be swung within the frame, the receptacles having vertically movable covers. The improvement may be used as a display rack, although especially designed to facilitate the carriage of large quantities of pastry, the rack being very durable and permitting of the ready arrangement of the articles within it, while the articles may be securely locked against displacement, and sufficiently covered to protect them during transit.

PUZZLE DICE BOX.—Hippolyte Goujon, Paris, France. This box is of barrel shape, and has a tapering, open end, with a shoulder in which fits a removable head with a removable plug and bung. The construction is such that it is a puzzle to find out how to open the box, the accessories tending to confuse one not understanding its intricacies.

METALLIC CEILING.—William W. and Robert H. Old, Leadville, Col. Panels formed with flanges are, by this invention, adapted to engage grooves formed in furring strips secured to the supporting beams or joists, the covering strips for the furring strips being formed with flanges interlocking with the flanges of the panels. By this means the panels are held in place so as to allow of expansion without bending or bulging, giving a neat and finished appearance to a wall or ceiling, and no screws, nails, or similar devices are needed to fasten the panels and covering strips in place.

TIMEPIECE CALENDAR.—Paul J. Johnson and Joseph H. Hamill, Globe, Arizona Ter. An attachment for watches and clocks is shown by this patent, which may be easily put on timepieces already in use, to indicate the day of the month. It consists of a metallic disk with a pointer extending inward from its edge, and with a central boss and graduated disk marked for the days of the month, this disk also having a notched periphery. A finger with curved spring arms is mounted on the boss of the hour hand and engages the notched periphery, so that on two revolutions of the hour hand a day's advance is marked on the graduated disk. The disk requires setting once a month.

WATCH CASE.—Victor Nivois, Brooklyn, N. Y. In a watch case shell filled with baser metal attached thereto by solder, and having on its inner face a recess, is a lift spring adjustably secured to the backing or filling, the larger part of the lift spring occupying a recess in the filling, while a catch or releasing spring forms a dust band, constituting essentially a circle within the center, and of such width that it conceals the filling, its recess, and the lift spring.

REVOLVING PAPER FILE.—Ralph E. Ferguson, Akron, O. This is a device for use in stores, etc., for filing checks, bills, sales slips, and memoranda, securely holding them and permitting of their convenient examination. It consists of a revolving frame carrying rings or disks one above the other, spring-pressed impaling pins being hinged on the rings or disks, and adapted to engage with their free ends recesses in the next following ring.

AXLE BEARING.—Thomas J. McGee, Hattiesburg, Miss. This is a bearing adapted for all sorts of vehicle wheels and axles, and which may be inexpensively made. The tapering axle box has a closed outer end provided with a threaded aperture and an annular recess in the inner end of the box to receive the axle collar, and to the outer end of the box a plate is secured overlapping the outer end of the hub and preventing the displacement of the box. When the parts are in place no dirt can get within the box and no oil can ooze out to injure the hub or collect upon any part of the vehicle.

ANIMAL SHEARS.—Charles and Harry Burgon, Malin Bridge, England. This invention relates to instruments for shearing or clipping sheep and other animals, and covers an improvement on a formerly patented invention of the same inventor, devising a better mode of mounting the forked crosshead upon the vibrating or oscillating lever, by which the top cutters are driven, and of applying a spring to press the cutters on the comb plate with the necessary pressure. An improved construction is also provided of the pivotal axis upon which the vibrating lever oscillates, whereby the working loose of the axis is avoided.

UNICYCLE.—Abraham and Fernando Yost, New York City. The main wheel of this machine has an inner toothed band, within which is mounted a stationary band, having overlapping side flanges, and supporting a suitable framework, in which is journaled a gear wheel extending through a slot to engage the teeth of the toothed wheel, while a seat-carrying frame supported on anti-friction rollers is held to contact with the toothed band, handle bars being supported in front of the seat. The wheel is adapted to be driven by a rider sitting within it, the driving mechanism being very simple and efficient.

CLOTHES LINE SUPPORT.—Robert McNab, Paterson, N. J. This invention relates especially to an adjustable safety arm for pulley clothes lines, such as are usually arranged with one end supported adjacent to a window of a building and with the other end upon an outside pulley. The arm is attached to the window frame, and supports the line-carrying pulley, which may be conveniently brought into any desired position and there fastened, while, when not in use, the arm may be dropped and held in a vertical position outside of the window.

MESSENGER'S PICKET.—James C. Hays, Rusk, Tex. This invention provides an improved form of bullet-proof cage or miniature fort in which an expressman or messenger may lock himself in case of danger, and fire upon an assailant with safety. It is practically a large box of sheet steel, mounted on rollers, and having a side door and port-holes with closing shutters, with means for attaching it to the flat top portion of the tender.

WINDOW SEAT.—Wm. Engler, Brooklyn, N. Y. This device is designed also to be used as a blackboard, music rack, or writing desk, and consists of a board having cleats at its opposite ends, a piece hinged to one edge, and a hinged bar folding into the rabbet of the edge of the hinged board, there being a sliding adjustable bar for leveling up the board when used as a window seat or writing desk, and a brace to hold it in inclined position when used as a blackboard or music rack.

TO START RACE HORSES.—James J. Sullivan, New York City. This invention provides a screen device so arranged as to insure a fair and prompt start for the horses, ranging the horses against the screen. The screen consists of side pieces, between which is secured a network, a wire connecting the upper ends of the pieces, to the lower ends of which is secured a wire carrying cushions, the improvement also covering other novel features. The device is designed to entirely avoid injuring or frightening the horses, and may be quickly and conveniently carried out of their path when a start is to be made.

MECHANICAL FLY TRAP.—Emil Rathgeb, New York City. A hollow waterwheel is, according to this invention, held to turn on a base board, and has face buckets with inwardly extending arms, a reservoir of sweetened water above the wheel delivering upon the buckets by slow dripping, so that the flies light upon the slowly turning wheel to drink the sweetened water, and are carried down to a tank beneath.

TOY MORTAR.—Grant B. Nichols, Wapakoneta, O. A stick or toy gun barrel has a toy mortar secured on its end, and provided with a ball seat, in the rear of which is an explosion chamber, to which leads a firecracker opening. The device is cheap and

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simple, and with it a child can safely shoot a toy ball by the explosion of a firecracker, the ball being readily directed as desired.

GAME APPARATUS. — Anton Scholz, Brooklyn, N. Y. This is an apparatus to be employed in conjunction with an ordinary spinning top, and consists of a plate having a handle, and with a central aperture forming a seat for the spinning top, as it may be caught up from the ground or floor while spinning, the top being marked with numerals around its body, while a pointer on the handle indicates the number at which the top comes to rest. The pointer may, if desired, be on the top, and the numerals on the plate around the aperture, the numbers in either case marking points made in a game.

DESIGN FOR A SPOON. — Joseph A. Hughes, Corpus Christi, Texas. This is a souvenir spoon representative of the State of Texas. Its leading feature is a head and bust of Davy Crockett on the end of the handle, while at the middle of the shank is a lone star, and on the bowl a representation of the old building known as the "Alamo."

DESIGN FOR A BARBER'S SIGN.—Ferdinand Svoboda and Charles Hofmann, Chicago, Ill. At the top of this sign is the figure of a man's head and face, with towel gathered about the neck, below which is a shield having stars on its upper portion, there being also stripes or panels on the face of the sign.

DESIGN FOR ORNAMENTING FABRICS. —Henry Sturm, Arlington, N. J. This design is more particularly applicable for night shirts, and comprises a conventional figure of Columbia grasping a sword with one hand and with the other a gonfalon.

DESIGN FOR A LEGGIN.—Samuel Borchardt, New York City. This leggin body has an extension top, ornamentation separating the extension top from the body portion, while the body and top of the leggin are made of contrasting colors to heighten the effect of the design, and cause the top to show to advantage through open panels.

DESIGN FOR A CARPET.—Pierre C. Chambellan, West Hoboken, N. J. The body of this design is formed of a large group of flower and leaf forms, partly surrounded by curving branches, while the border is composed of groups of flower and leaf forms and spiral branching arms and ornamental inner and outer margins.

DESIGN FOR A SHEPHERD'S CROOK.—Albert L. Babcock, Billings, Montana. This crook has a somewhat pear-shaped loop, from which the outer end of the crook sweeps gradually outward to some distance from the handle.

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BUILDING EDITION.

SEPTEMBER NUMBER.—(No. 83.)

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(4530) J. W. L. asks: Suppose I have two dynamos, 110 volts each, one 200 and the other 400 amperes, connected in shunt on the main line, and have a load of 400 amperes, and the load being equal on both machines; now, there is a demand on the line for 600 amperes; now, does the load continue to be equal on both machines or does the 400 ampere machine take the load? A. The following is furnished by Mr. Edison: Two dynamos, one having double the capacity of the other, would not share the load equally, unless the e. m. f. of the smaller were made a little in excess of that in the armature of the larger machine. This being done, however, and the load equally divided, a still further increase will be shared unequally, the larger machine taking the greater share of the increase. In practice, of course, the e. m. f. of each machine is so controlled that its proper load is taken.

(4531) E. G. P. writes: I would like to know in what way salt effects the freezing of ice cream. A. By causing the ice to melt, on account of its own slight affinity for water. The ice in melting rapidly absorbs heat or renders heat latent, and hence reduces the temperature below that of ice, which simply melts by heat acquired from surrounding objects by conduction or convection of air.

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Wrench. See Pipe wrench.	
Wrench, Guiley & Wright	482,245
Wrench, F. Mossberg	482,021
Wrench, J. Ryan	482,198
Wrench, G. B. Stevenson	482,281
Yoke, neck, J. Ziegler	481,996

DESIGNS.

Badge, W. B. Munger	21,846
Box, C. L. Dobrick	21,840
Button, W. J. Van Keuren	21,843
Brushes or similar articles, backs of, C. C. Wientge	21,847
Chair, Z. Nuttall	21,849
Clasp, S. Baxter	21,845
Handle for spoons, etc., J. W. Maillot	21,837
Handle for spoons, etc., C. C. Wientge	21,838
Handle for spoons, etc., G. Wilkinson	21,839
Metal border, C. Osborne	21,848
Planers, cutter head hood for, J. Roberts	21,850
Spoon, R. E. Acton	21,835
Spoon, A. H. Fancher	21,836
Stove, oil heating, M. G. Benedict	21,853
Stove, oil or gas, Thissell & Wilder	21,852
Stove or range, O. G. Thomas	21,851
Thimble, H. A. Weihman	21,844
Trimming, C. Lexow	21,830
Trimming, H. M. Sacks	21,832, 21,833
Trimming, J. W. Schloss	21,831
Trimming, L. Tisch	21,834
Trumpet, A. Schoenhut	21,841, 21,842

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Publication, monthly, M. N. Forney	21,721
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Tablets for throat and lung diseases, Kurum Chemical Co	21,722
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A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 25 cents. In ordering please state the name and number of the patent desired, and remit to Munn & Co., 361 Broadway, New York.

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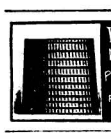
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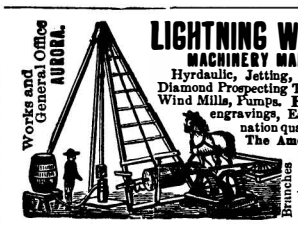
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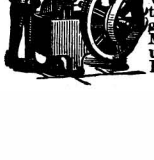
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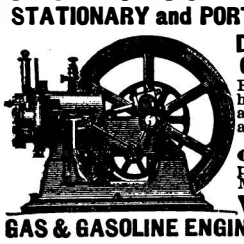
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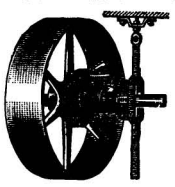
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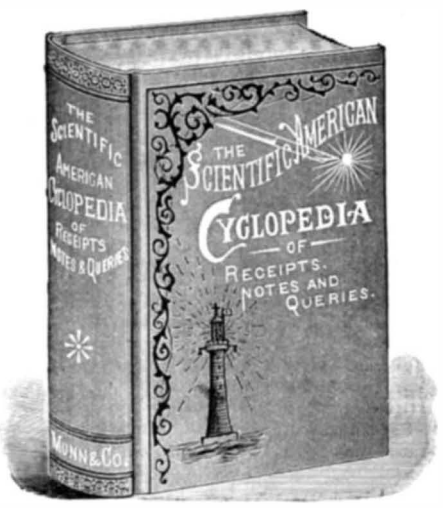
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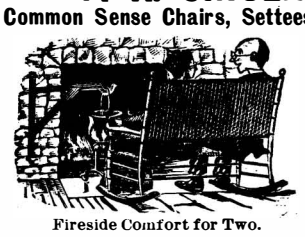

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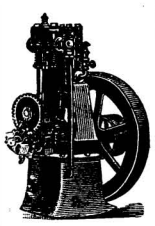

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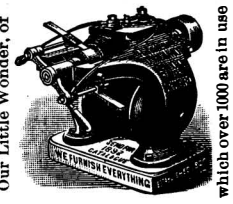

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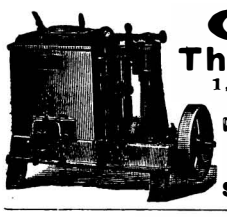

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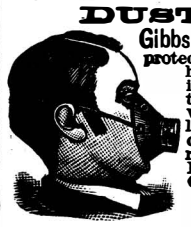

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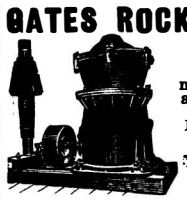

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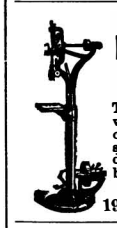

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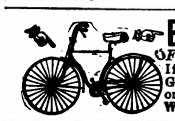

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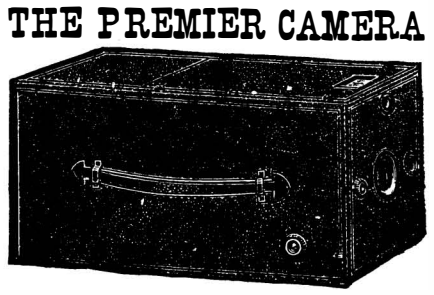

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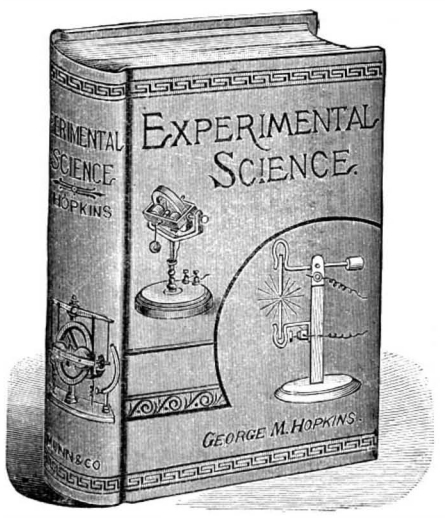

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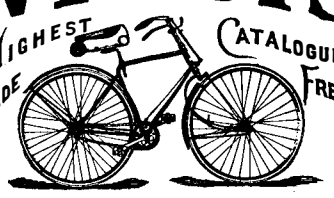

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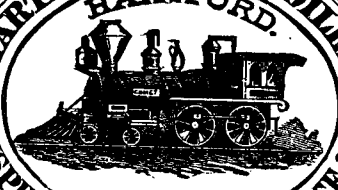

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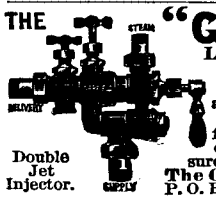

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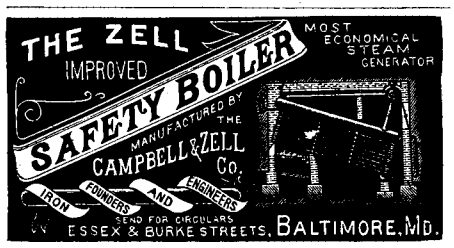

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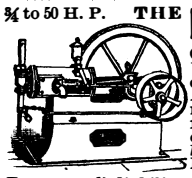

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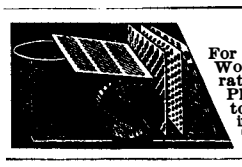

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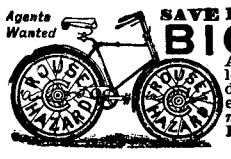

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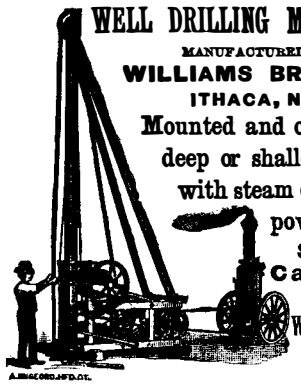

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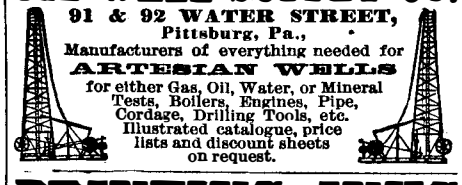

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